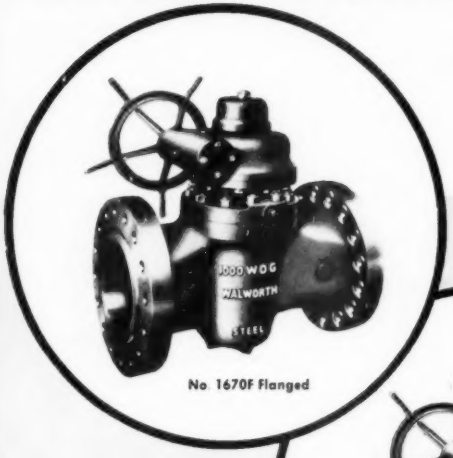
the OIL AND GAS JOURNAL

BUILT FOR *DEPENDABLE* SERVICE WHERE DURABILITY IS A "MUST"

Walworth Lubricated Plug Valves assure tight Shut-Off . . . Easy Operation



No. 1670F Flanged

No. 1670WE Welding Ends

Walworth Steel Ball Bearing Lubricated Plug Valves . . . 1000 Pound WOG . . . Venturi Pattern — Worm Gear Operated

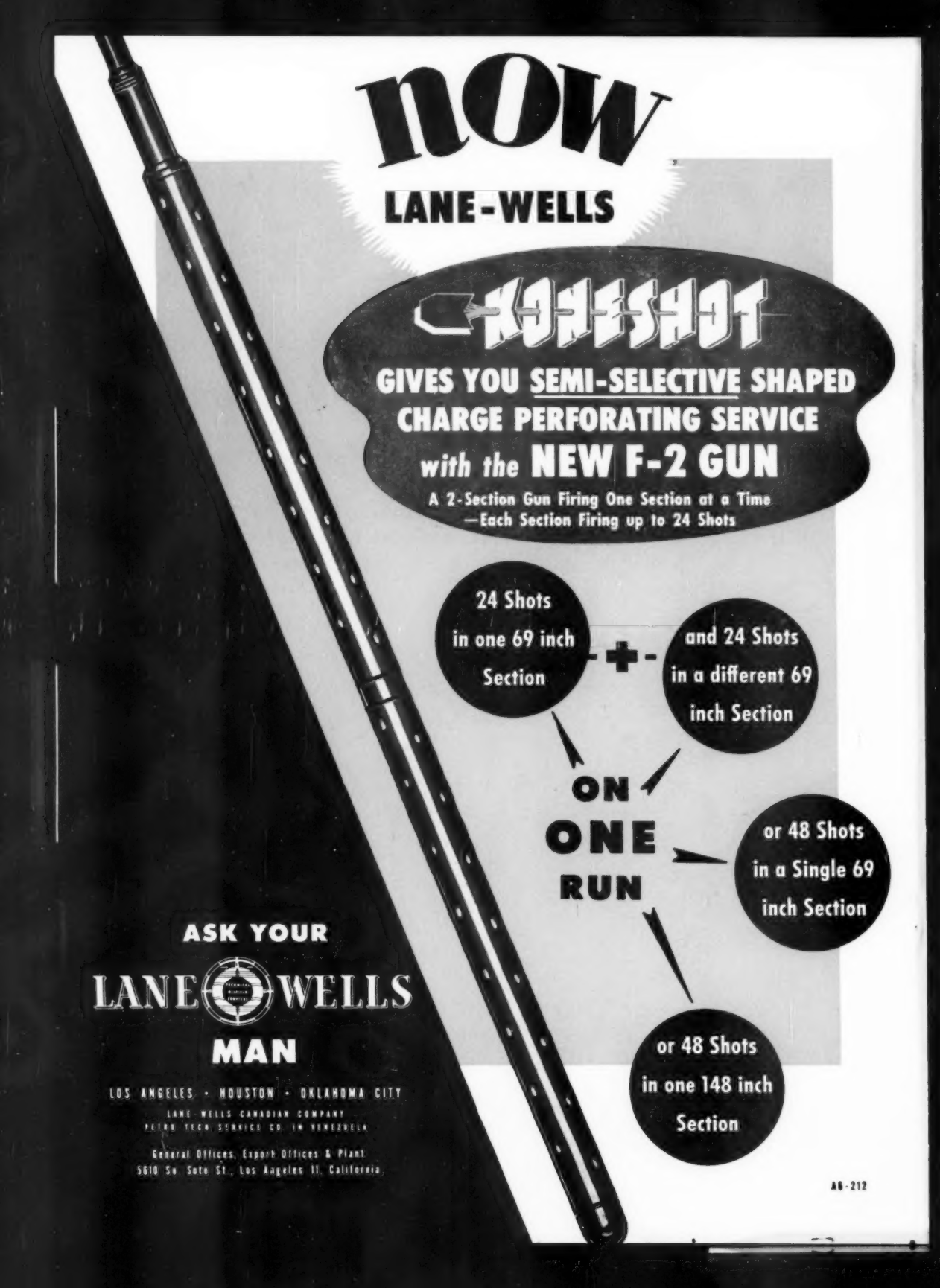
Walworth manufactures a complete line of Lubricated Plug Valves in sizes from ½" to 30" for pressures from 125 to 5,000 psi. water, oil, or gas; and for vacuum requirements. These valves are designed and engineered for specific service requirements in the production, refining and distribution of petroleum products.

For full information concerning the complete line of Walworth Lubricated Plug Valves, see your Walworth distributor, or write today for your free copy of Walworth Catalog 46L.

WALWORTH valves and fittings
60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

PRICE 50 CENTS TABLE OF CONTENTS PAGE 37 **NOVEMBER 24, 1949**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KONESHOT
GIVES YOU SEMI-SELECTIVE SHAPED CHARGE PERFORATING SERVICE with the NEW F-2 GUN
A 2-Section Gun Firing One Section at a Time —Each Section Firing up to 24 Shots
24 Shots in one 69 inch Section
+
and 24 Shots in a different 69 inch Section
ON ONE RUN
or 48 Shots in a Single 69 inch Section
or 48 Shots in one 148 inch Section
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Everything

from alloy studs

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That's covering quite a lot of territory. But our refinery stocks are so well selected that you can get what you want merely by phoning us.

Studs and nuts, valves, fittings, hose and packing, tubular goods, expansion joints, gages, thermometers, regulators . . . these and many other commonly-needed products are available at the nearest Bethlehem Supply store. And, if it's an engineered item—such as a pump or a furnace—we can help you determine the unit that will do the best job; save you the time and expense of running it down yourself.

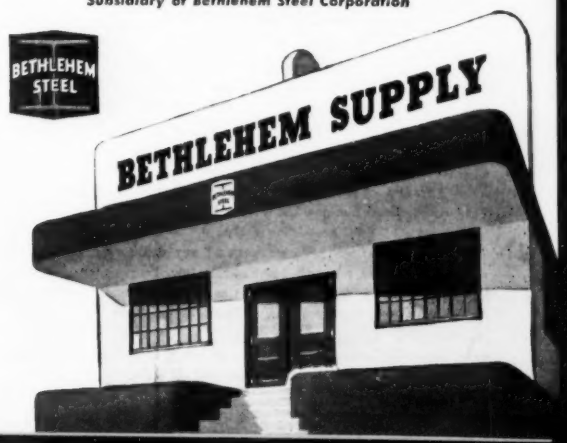
As an example, a group of six Petro-Chem Iso-Flow furnaces were specifically designed for the Maysville Plant of Warren Petroleum Corporation.

Maybe all you need today is some studs. Or maybe you're figuring something big, like an Iso-Flow heater. Whether it's big or little or in between, get Bethlehem Supply on the job.

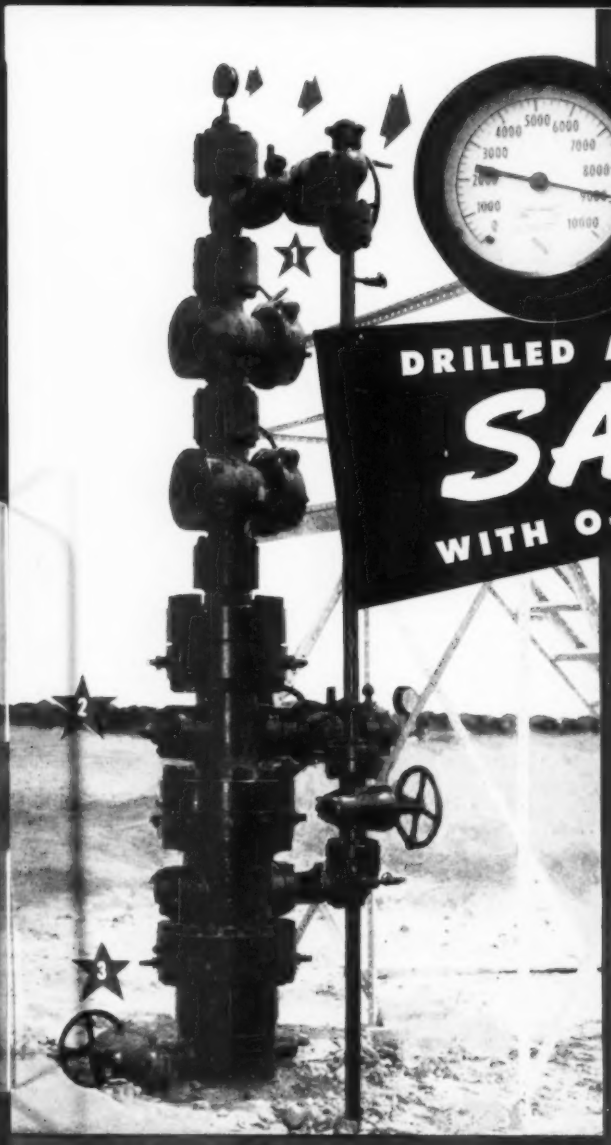
BETHLEHEM SUPPLY COMPANY

General Offices: 21 E. Second St., Tulsa, Okla.

Subsidiary of Bethlehem Steel Corporation



HEADQUARTERS for REFINERY SUPPLIES



CONTINENTAL'S ESTES NO. 1
...WORLD'S HIGHEST PRESSURE WELL

DRILLED AND COMPLETED SAFELY WITH O-C-T EQUIPMENT

1 **O-C-T PC CHOKE**

2 **O-C-T TUBING HEAD**

3 **O-C-T "C-19" CASING HEAD**

Twice this year, Oil Center Tool Company equipment has been used on world record wells . . . on the world's deepest well in Wyoming and now on the world's highest pressure well in Louisiana.

On Continental Oil Company's Estes No. 1, located near Welsh, La., the pressure gauge stood at 8,920 pounds tubing pressure. Bottom hole pressure is ± 11,000 psi. The well is 11,476' deep. The production sand is from 11,263'- 11,269'.

With the O-C-T "C-19" casing head as the foundation, the wellhead assembly on this world's highest pressure well consists of the C-19 casing head and the O-C-T T-16 OU tubing head, "topped off" by the new O-C-T PC production choke.

On your next well . . . on wells of any depth or pressure . . . take advantage of the added strength, safety, convenience and flexibility provided by dependable Oil Center Tool Company equipment. As a result of progressive engineering and precision manufacturing practices, O-C-T now produces a line of "precisioneered" products which have materially increased the margin of safety in drilling, completing and producing deep, high pressure gas and oil wells.

O-C-T CONGRATULATES THE MEN WHOSE SKILL AND COURAGE WERE RESPONSIBLE FOR SAFELY DRILLING AND COMPLETING THIS WORLD'S HIGHEST PRESSURE WELL.

Oil Center Tool Co.

P. O. Box 3091, Houston, Texas

Export Representatives: Venezuela, Colombia, Peru, and Ecuador – Berry & Holt, Apartado No. 304, Maracaibo, Venezuela. Sterling Areas—Le Grand, Sutcliff & Gell, Ltd., Southall, Middlesex, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston 1, Texas.

Hose with a tube that's tougher than steel

New B.F.Goodrich mud pump hose, tougher on the outside, smoother on the inside

HERE'S a mud pump suction hose that's a real roughneck. It's tougher on the outside, tougher *and* smoother on the inside. The cover is practically abrasion-proof. The tube is the smoothest bore in the business. Inside and out, it can take more rough wear than any mud-line hose you've ever used.

Tube tougher than steel — This new hose has a smooth-bore tube of Armorite, the exclusive B.F.Goodrich compound that has the highest abrasion resistance of any known rubber — actually tougher than steel in many applications. This tube, of "gun-barrel" smoothness, keeps abrasive mud moving through at high speed, resists inner wear, keeps turbulence down.

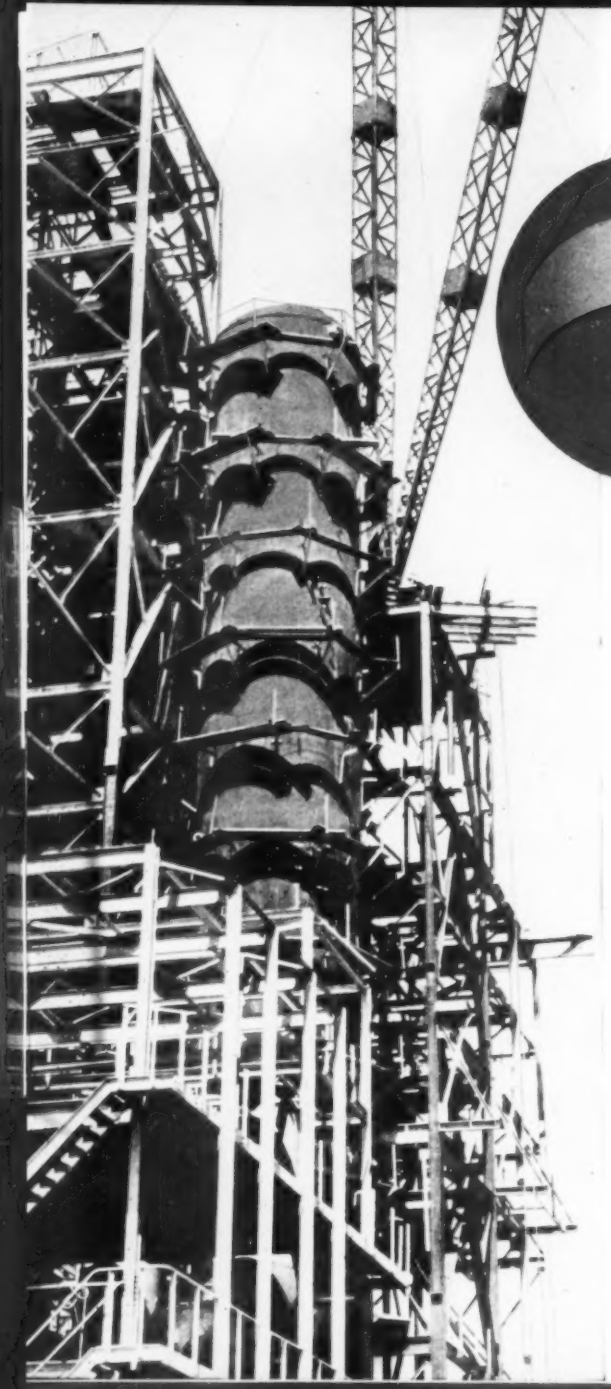
Handles high suction pressures — This hose will take the highest vacuum pressures used in mud pump work. A heavy spring-steel helix embedded in the hose prevents collapse, costly tie-ups, keeps your rig drilling.

Fuller flexibility — Weftless construction — each cord free of confining cross-threads — makes this hose more flexible, yet resistant to crushing and kinking without excessive weight, helps dampen vibration.

Tough cover, too — You don't have to handle this hose with kid gloves when moving from job to job, dragging it into position, loading it into a truck. The extra-tough cover was made to stand extra-hard use.

To keep mud moving smoother, faster, get this new B.F.Goodrich suction hose. Also ask for B.F.Goodrich vibrator hose and rotary drilling hose. *The B.F.Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Mud Pump Hose BY **B.F.Goodrich**



UP AND IN PLACE
...on schedule

THE date for this particular stage of construction was determined months ahead of time. Each phase of McKee refinery engineering, procurement and construction is scheduled to coordinate with the next and to proceed in a minimum of time. Every McKee facility is employed to maintain or exceed that schedule. This takes experience, planning and *organization*, but it saves time and money. That's good for your business—and ours too.

ARTHUR G. McKEE & COMPANY

DESIGN, ENGINEERING AND CONSTRUCTION FOR THE PETROLEUM REFINING AND IRON AND STEEL INDUSTRIES

ENGINEERS AND CONTRACTORS • ESTABLISHED 1905
2300 CHESTER AVENUE, CLEVELAND
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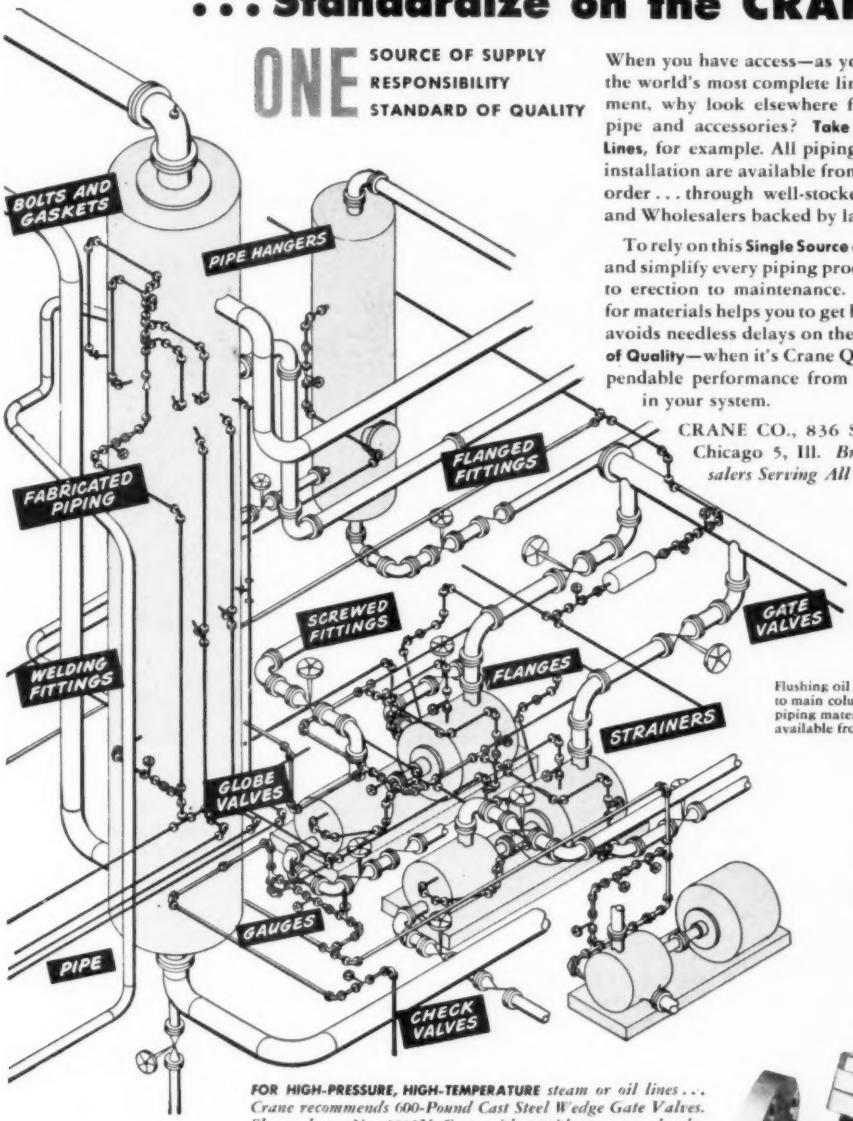
How to simplify piping jobs ... Standardize on the CRANE line

ONE SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY

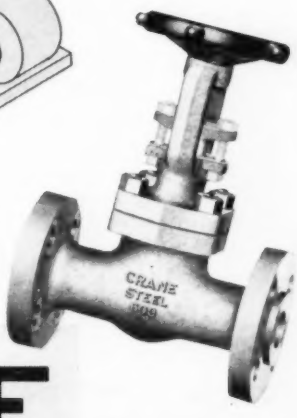
When you have access—as you do at Crane—to the world's most complete line of piping equipment, why look elsewhere for valves, fittings, pipe and accessories? **Take these Flushing Oil Lines,** for example. All piping materials for the installation are available from Crane . . . on one order . . . through well-stocked, local Branches and Wholesalers backed by large factory stocks.

To rely on this **Single Source of Supply** is to speed and simplify every piping procedure from design to erection to maintenance. **One Responsibility** for materials helps you to get better installations, avoids needless delays on the job. **One Standard of Quality**—when it's Crane Quality—assures dependable performance from every piping item in your system.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill. *Branches and Wholesalers Serving All Industrial Areas.*



Flushing oil lines to main column—all piping materials available from Crane.



FOR HIGH-PRESSURE, HIGH-TEMPERATURE *steam or oil lines . . . Crane recommends 600-Pound Cast Steel Wedge Gate Valves. Shown here, No. 3615X Gate with outside screw and yoke. Exelloy to Exelloy seating makes these valves ideal for oil and oil vapor services up to 1000 deg. F. Flanged, screwed, or socket-welding ends. Sizes: ½ to 2 in. See your Crane Catalog.*

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PIPE • PLUMBING
AND HEATING

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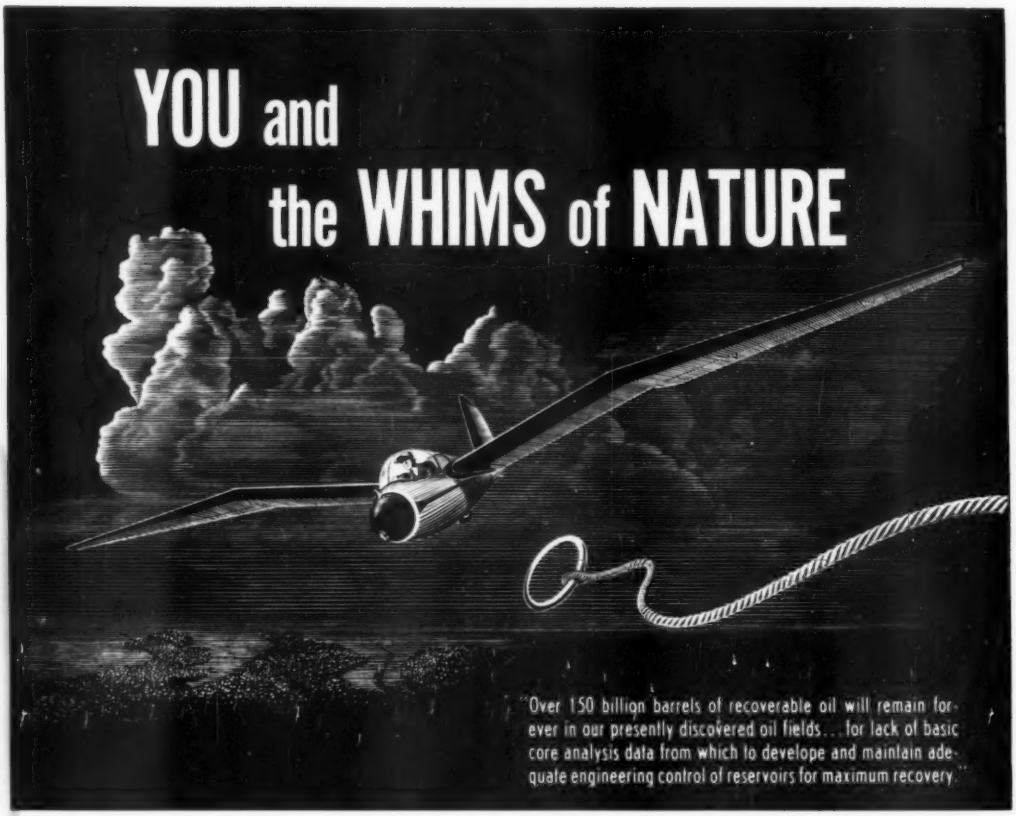
FOR EVERY PIPING SYSTEM

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1949.

YOU and the WHIMS of NATURE



"Over 150 billion barrels of recoverable oil will remain forever in our presently discovered oil fields... for lack of basic core analysis data from which to develope and maintain adequate engineering control of reservoirs for maximum recovery."

Maximum ultimate recovery from a reservoir, like successful motorless flight, boils down to two factors – man versus the whims of nature.

As a sailplane must be kept aloft by a pilot trained in the science of aerodonetics, so must the profitable discovery, completion, and production of an oil field rely upon experienced personnel to apply the science of petroleum reservoir engineering against fickle producing characteristics of underground formations.

Core Lab's Services are founded on the commercial study of over 19,000 wells in every stage of reservoir development. No other service organization in the industry can approach that enviable record and reputation. Nor can any other service organization in the industry offer more direct aid in your quest for maximum ultimate recovery.

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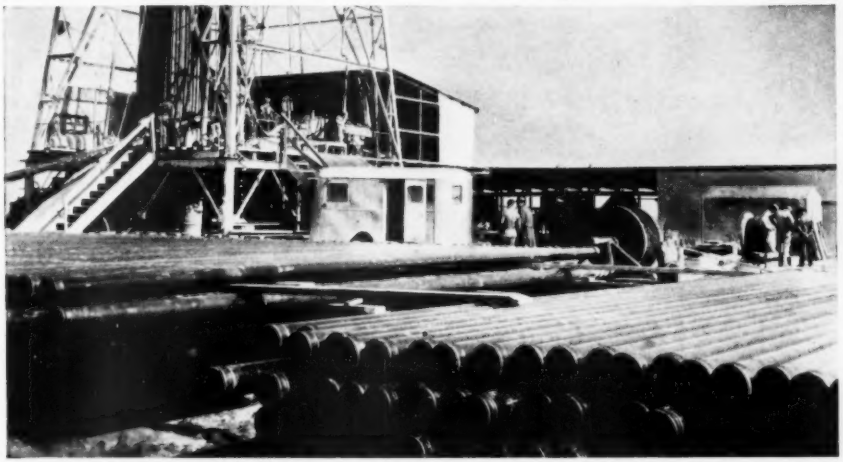
"From discovery to maximum recovery."

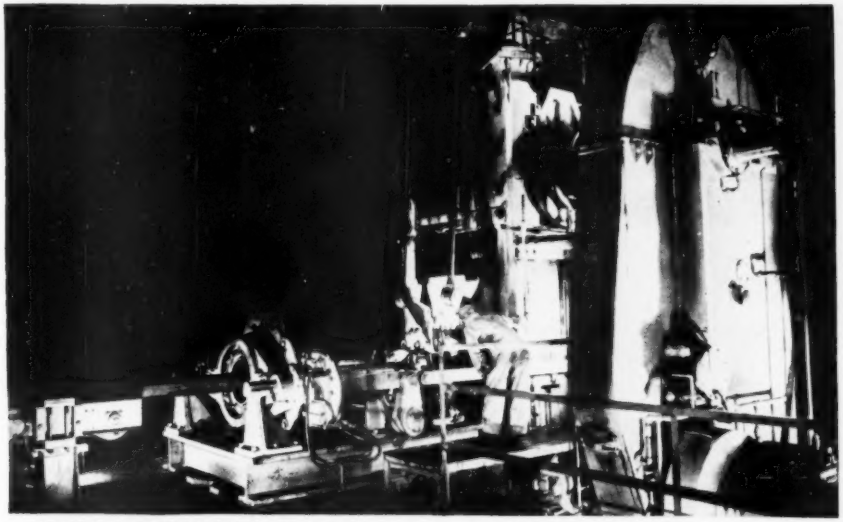
CORE LAB
PETROLEUM RESERVOIR ENGINEERING

DEPENDABILITY THROUGH



IN THE FIELD, LOUISIANA: Running a 10,000-ft. string of 8⅝-in. S-80 A. O. Smith Casing.

RESEARCH AND ENGINEERING



IN THE A. O. SMITH PIPE MILL: Research developed this special Smith-designed cold-compression machine for externally sizing A. O. Smith Casing.

A. O. SMITH FORGED STEEL WHEEL 75th ANNIVERSARY 1874 · 1949

A.O.Smith

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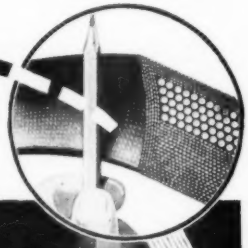
Pittsburgh 19 • Chicago 4 • Houston 2 • Dallas 1
Seattle 1 • Tulsa 3 • Los Angeles 14 • International
Division: Milwaukee 1

You can actually *feel* the sides of a belt *change shape* as the belt bends.

In Two Minutes You Can See Exactly How . . .

The Concave Side

(U.S. Patent No. 1813698)



SAVES Your Transmission DOLLARS

Take *any* V-belt in your hands and bend it as it bends in going around a pulley. You will see that the top of the belt, being under *tension*, grows *narrower*. The body, under compression, *widens*. The sides *bulge out*.

This shape change—in a *straight-sided* V-belt—is shown in Figures 1 and 1-A, below.

Straight-Sided V-Belt

How Straight-Sided V-Belt Bulges in Sheave-Groove.

Now look at Figures 2 and 2-A. There you see how the *same shape change* affects the V-belt built with the precisely engineered *Concave Side* (U.S. Patent No. 1813698).

Gates Vulco Rope with Concave Side.

No Side Bulge. Precise Fit in Sheave Groove.

The top of the belt narrows, the body widens. But the sides *merely straighten—and* the new shape *exactly fits* the sheave groove!

Two savings result. (1) Uniform side-wall wear *—longer life!* (2) Full side-wall grip on the pulley carries heavier loads and *sudden load increases* without slipping; saves belts, saves *power!*

The Mark of SPECIALIZED Research

The Concave Side is
MORE IMPORTANT NOW Than Ever Before

Because the sides of a V-Belt are what actually drive the pulley, it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley directly through the belt's sidewalls.

Now that Gates SPECIALIZED Research has made available to you SUPER Vulco Ropes—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side is naturally more important in conserving belt life today than ever before.

4910

GATES VULCO ROPE DRIVES
Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

THE GATES RUBBER COMPANY
DENVER, U.S.A.
The World's Largest Makers of V-Belts

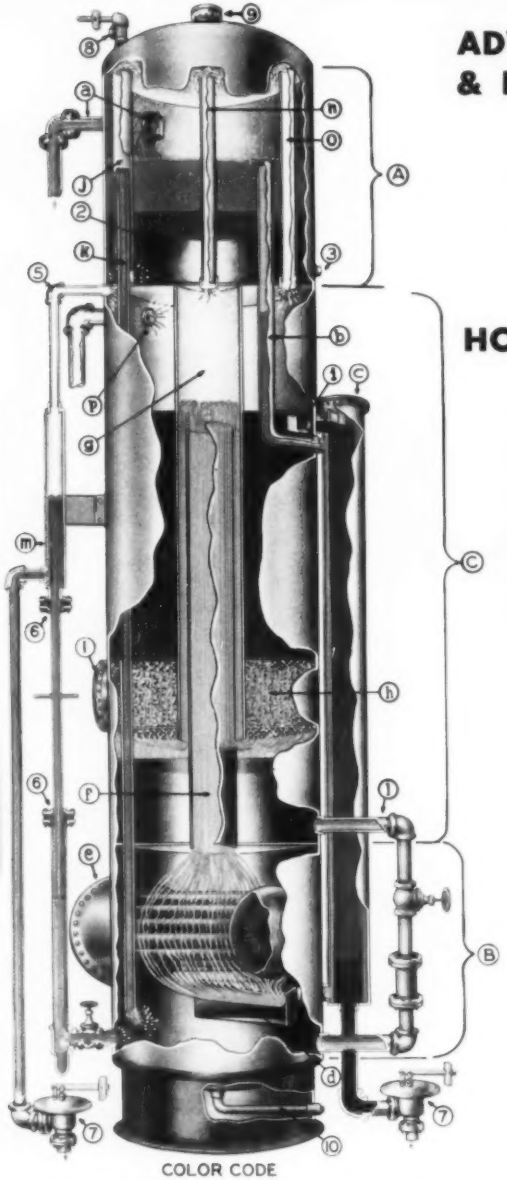
Type F Treaters

Handles Tough Emulsions Faster

B S & B Treaters are engineered to save production time by shortening shutdowns, to deliver the maximum output of gas and oil of highest gravity to tanks at the lowest cost per barrel. B S & B Type F Treaters are available in four standard sizes . . . 4, 6, 8 and 10 ft. diameter by 28-ft. shell length. Call your nearest B S & B Sales Representative today for complete information, or write the Oil Field Equipment Division, Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Missouri

Black, Sivalls & Bryson, Inc.

BS&B TYPE "F" TREATERS



COLOR CODE

● EMULSION ● WATER ● TREATED OIL GAS

ADVANTAGES OF BLACK, SIVALLS & BRYSON TYPE "F" TREATERS:

Separate Drainage of each of three Treater Compartments—Firebox Inspection can be completed in *less than an hour*—entire job of removal, inspection, cleaning, replacement and resumption of production can be done in *less than four hours* by *two men*—Higher gas separating capacity—Large settling section—Greater heating capacity!

HOW IT WORKS

Production from well enters classification section (A), through side inlet (a). Cold gas separates from liquid. Emulsion and water stratify in free water knockout part of section.

EMULSION

Emulsion flows from classification section through conductor pipe (b) to outside heat exchanger (c). From heat exchanger emulsion passes into heating section (B). It is discharged into heating section through distributor pan (d) under removable firebox (e). Emulsion is heated as it passes upward through salt water bath around firebox. Heated emulsion moves upward through flume (f). Gas evolved from heating is allowed to escape at top of flume. Gas-free emulsion flows downward through outer flume (g) and is finally discharged into quiet settling section (C). Final separation of emulsion into treated oil and water is completed in this section. Oil passes upward through filter bed (h). Treated oil is removed through outlet (i) to heat exchanger (c). It passes to stock tanks as treated oil.

FREE WATER

Free water, which has accumulated in classification section, passes through fixed syphon (j), down conductor pipe, to point of discharge near bottom of treater. Small particles of oil that may be entrapped in free water are freed and pass into emulsion stream around firebox. Some water, due to heating, will separate from emulsion in heating section and remain in lower part of treater. Water that is separated in settling section passes back to bottom of treater through outside water equalizer pipe (l). All of water accumulated during treater operation is now at the bottom of treater, and is withdrawn through outside adjustable water syphon (m).

GAS

When original well stream entered classification section cold gas was separated from liquid. Hot gas, freed when emulsion was heated, passes upward through flume (f) and gas equalizer pipe (n) to classification section. Hot gas mixes intimately with the cold gas. The resulting cool mixture causes condensation of light fractions which drop back into emulsion. Cool gas then passes through pipe (o) to gas zone above oil settling section. Here further condensation may occur. Dry gas is finally removed through side outlet (p).

BS&B EMULSION TREATERS

BLACK, SIVALLS & BRYSON, INC., Oil Field Equipment Division, 720 Delaware, Kansas City, Missouri

Yes, I am interested in BS&B's Type "F" Emulsion Treater:

☐ Please send me data and descriptive literature.
☐ Please have a BS&B Sales Engineer call on me.

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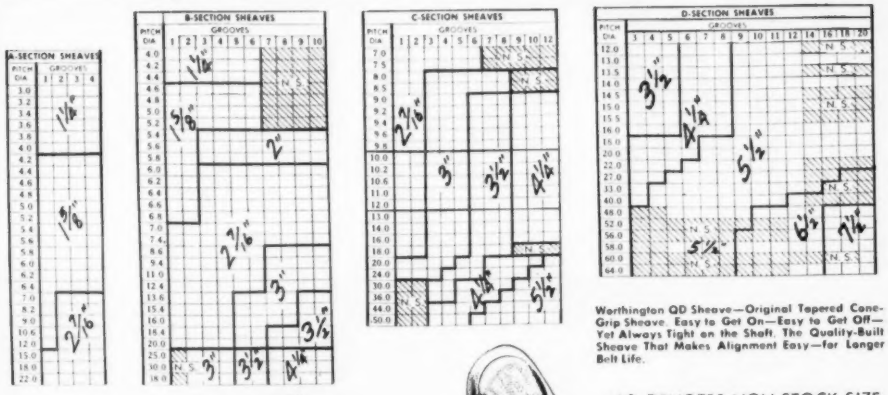
SEND NOW!

MAIL COUPON TODAY for all the facts . . . capacities, specifications, descriptive literature!

BLACK, SIVALLS & BRYSON, INC.
KANSAS CITY, MISSOURI

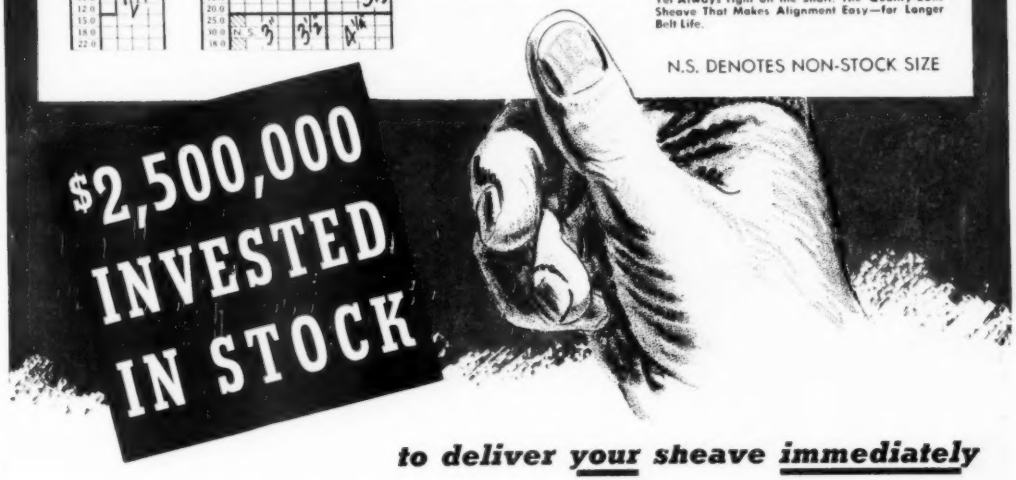
THE GOOD RIGHT HAND OF INDUSTRY

STOCK SIZES WORTHINGTON HEAVY DUTY "QD" SHEAVES WITH MAXIMUM BORES INDICATED



Worthington QD Sheave—Original Tapered Cone-Grip Sheave. Easy to Get On—Easy to Get Off—Yet Always Tight on the Shaft. The Quality-Built Sheave That Makes Alignment Easy—for Longer Belt Life.

N.S. DENOTES NON-STOCK SIZE



to deliver your sheave immediately

As long as it takes our distributor's shipment to get there is as long as it takes—in most cases—to get exactly the sheave you need into your hands. Your Worthington distributor has practically any stock size you'd ever call for—if he hasn't, one of the Worthington warehouses will get it to him in 24 hours or less.

Check your sheave requirements. With more sheaves listed as "stock sizes" and more sizes in stock than any other distributor, your Worthington distributor may be able to save you the cost of a special sheave.

Top-ranking distributors in the oil fields handle Worthington QD Sheaves and Worthington-Goodyear V-belts. They are backed by Worthington warehouses whose stocks duplicate the factory stock at Buffalo—more sizes stocked than any other sheave on the market. With 853 sizes in "A", "B", "C" and "D" section, ½ to 600 hp, you can fill almost any rpm requirement with a *stock* sheave. Also: 332 listed stock sizes of EC Cord V-belts.

So, when you need sheaves, call your local oil-field dealer.

For Balanced Drive Performance

Specify Worthington Multi-V-Drives, with QD Sheaves and Worthington-Goodyear EC Cord V-belts. (Goodyear EC Cord or Steel Cable V-belts are used exclusively in Worthington Multi-V-Drives.)

WORTHINGTON

WORTHINGTON PUMP AND MACHINERY CORPORATION
MULTI-V-DRIVE SALES DIVISION
Buffalo, New York—General Offices: Harrison, New Jersey

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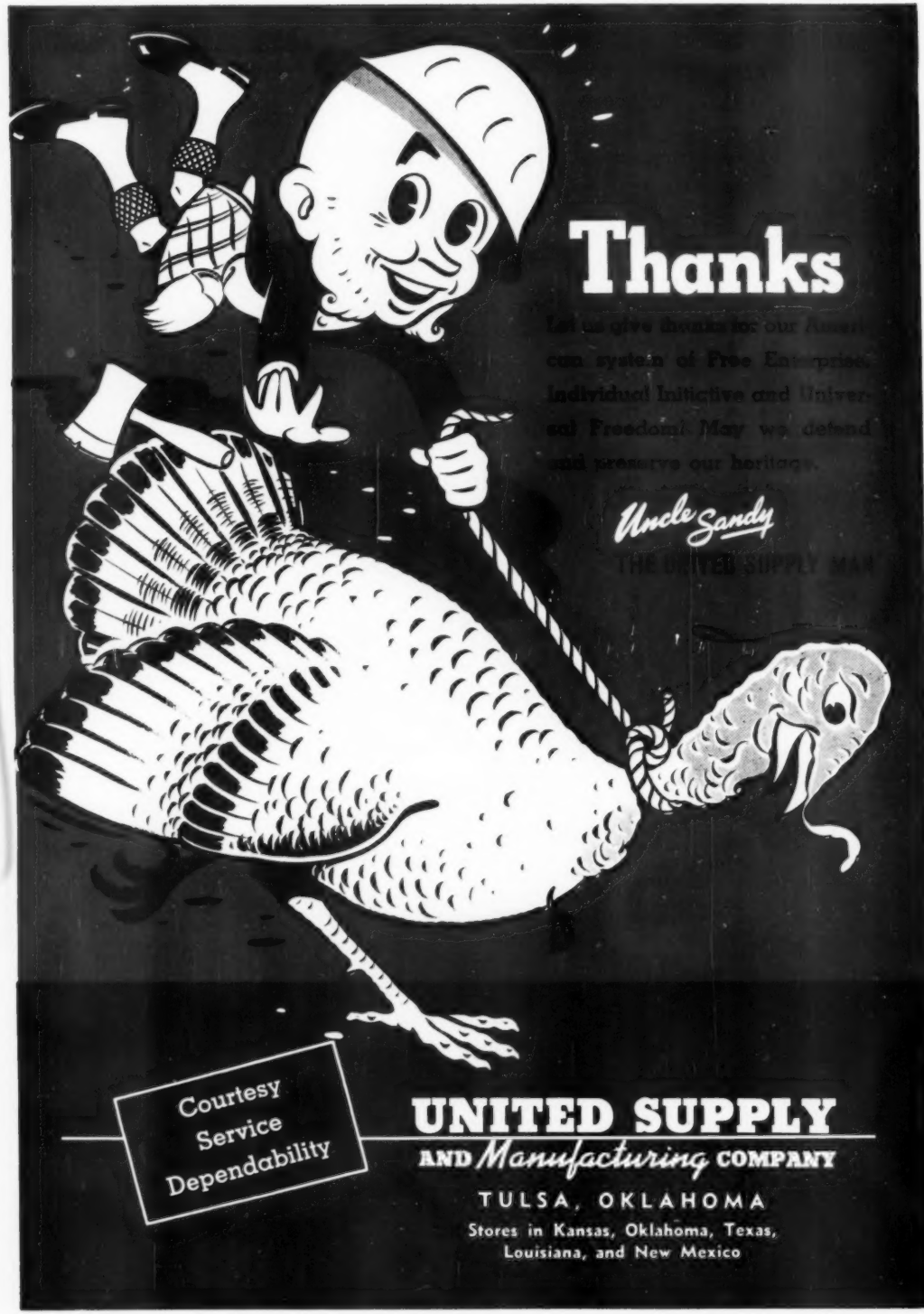
POWER TRANSMISSION: sheaves, V-belts, variable speed drives
PUMPS: centrifugal, power, rotary, steam
AIR COMPRESSORS: water-cooled, air-cooled

MVJ928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Uncle Sandy
Courtesy
Service
Dependability
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AND Manufacturing COMPANY
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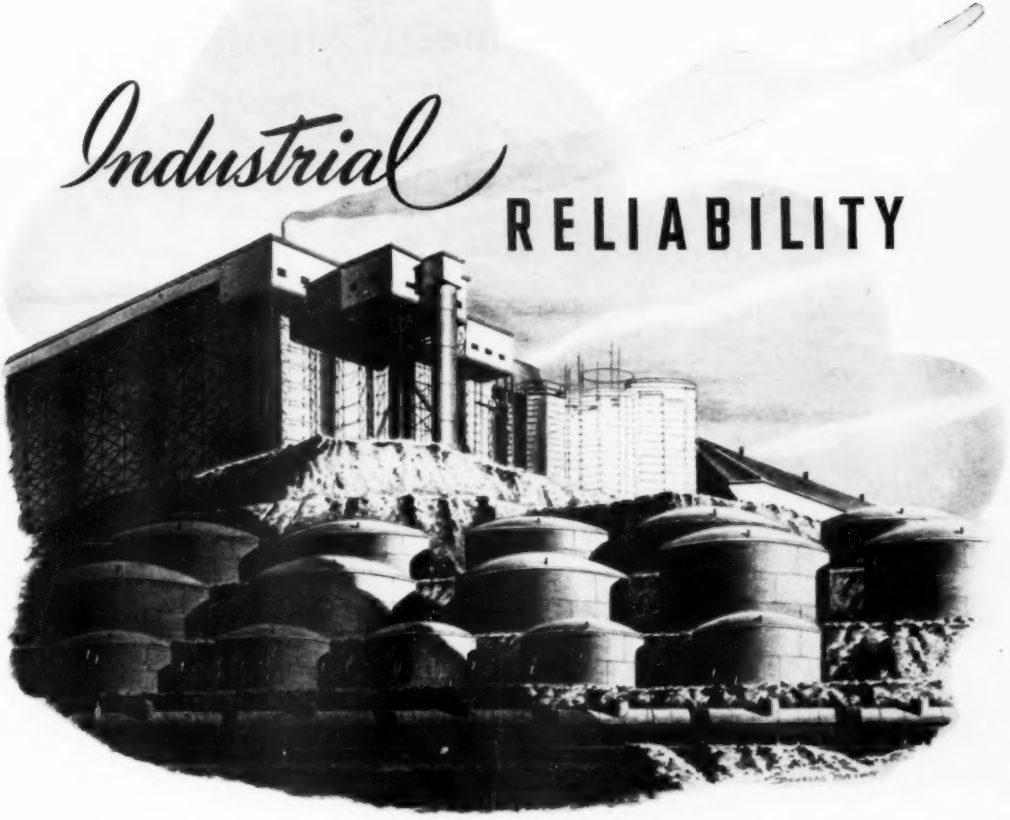
Stores in Kansas, Oklahoma, Texas,
Louisiana, and New Mexico

Industrial RELIABILITY



Whether it is one tank or a dozen...large or small...pressure or gravity...you can depend on the workmanship of Southland Steel Products. Years of industrial application experience satisfying our chemical and processing customers is your assurance that a Chattanooga Boiler and Tank job will serve you efficiently... economically. So, when you need structural steel, hoppers, bins or tanks, call on us for reliable steel fabrication.

CHATTANOOGA BOILER and TANK CO.

Chattanooga, Tenn.

OVER 40 YEARS OF SERVICE STEEL SOUTHLAND PRODUCTS **TO AMERICAN INDUSTRY**

This **HOMESTEAD VALVE** opens or closes instantly . . . every time . . . any time

IT'S STICK-PROOF BECAUSE IT'S LEVER-SEALD

HOMESTEAD LEVER-SEALD QUARTER-TURN VALVES have been first choice for more than 16 years in services where extremes of temperature or pressure, or corrosive fluids, cause ordinary valves to "stick" or "seize".

They are "stick-proof" because built into each valve is a powerful lever-and-screw device that prevents sticking and assures positive action at all times under all conditions.

They operate faster too, than screw-stem type valves . . . 16 to 28 times faster. And the quarter-turn principle makes them ideal for installation in restricted areas, next to walls, floors, ceilings, congested piping and other obstructions where other types of valves could not be used. Next time you have a sticking or damaged valve replace it with a Homestead LEVER-SEALD Quarter-Turn Valve. You'll never be satisfied with ordinary valves again.

Homestead Lever-Seald Quarter-Turn Valves are available in metals and alloys to suit your needs in sizes from $1\frac{1}{2}$" to 10" for pressures from vacuum to 1500 lbs.

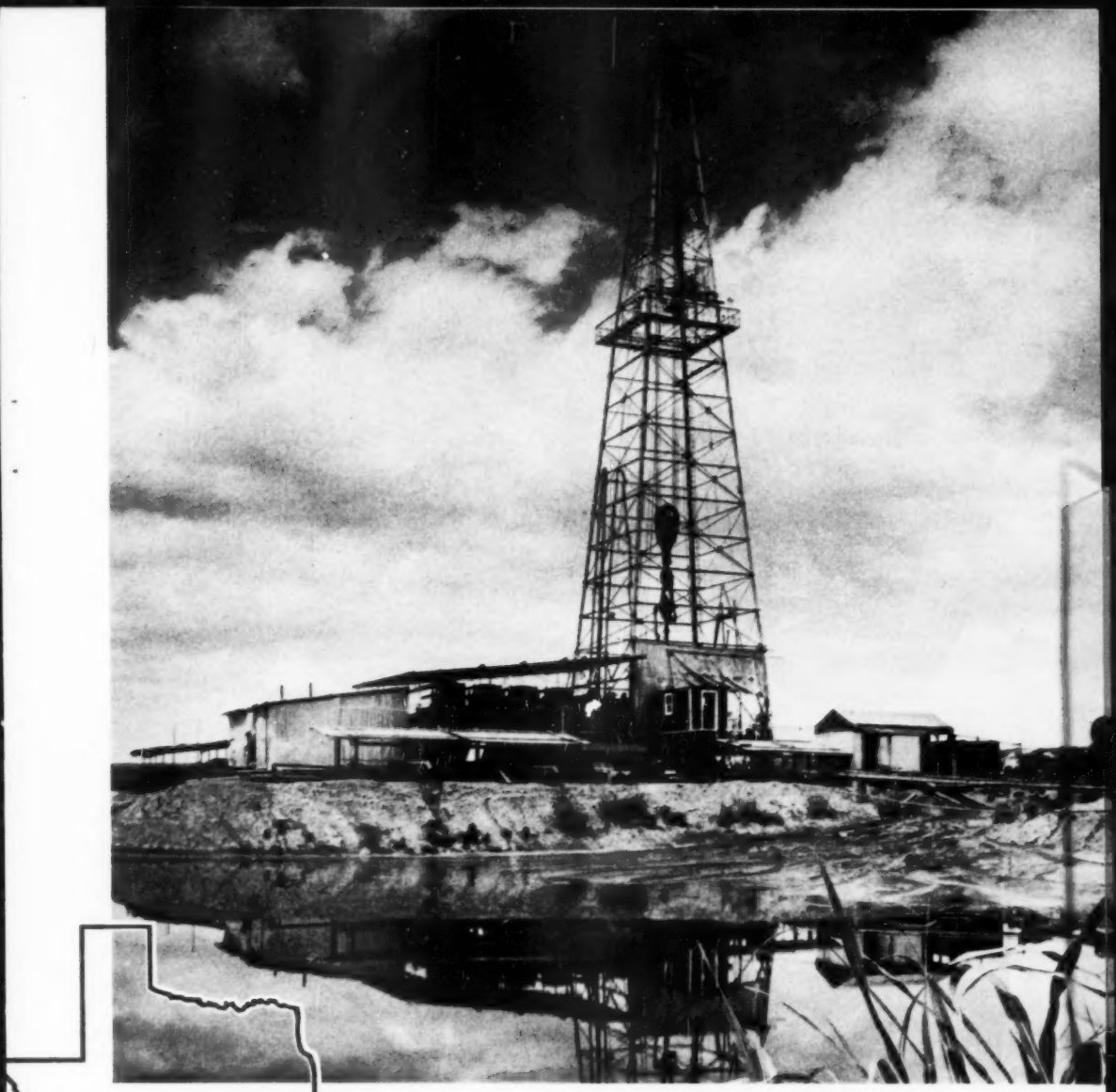
- **Instant Stick-Proof Operation.**
- **Quarter-turn fully opens or closes.**
- **Seating surfaces always protected. Corrosion practically eliminated.**
- **Unobstructed straight-line fluid flow.**
- **All moving parts protected from effects of service conditions and weather.**

For full particulars send for "Valve Reference Book No. 39-3." Write today.

HOMESTEAD VALVE MANUFACTURING CO.

"Serving Since 1892"

P. O. Box 403 **Coraopolis, Pa.**



TEXAS WELLS, too, reflect the overwhelming preference of oil country men everywhere for U·S·S National Seamless Drill Pipe, Casing and Tubing—a preference that is based on the consistently good results obtained with these superior seamless steel products under every conceivable drilling condition. For detailed information on U·S·S National oil country goods, write National Tube Company, Frick Building, Pittsburgh, Pennsylvania. Ask for Bulletin No. 15.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

WALLS WITHOUT WELDS

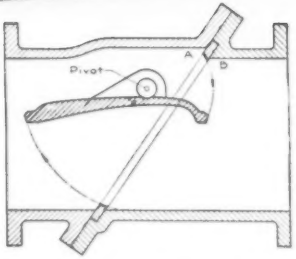
USS

NATIONAL SEAMLESS

drill pipe...casing...tubing

UNITED STATES STEEL

THERE IS *No Slamming* WITH CHAPMAN TILTING DISC CHECK VALVES



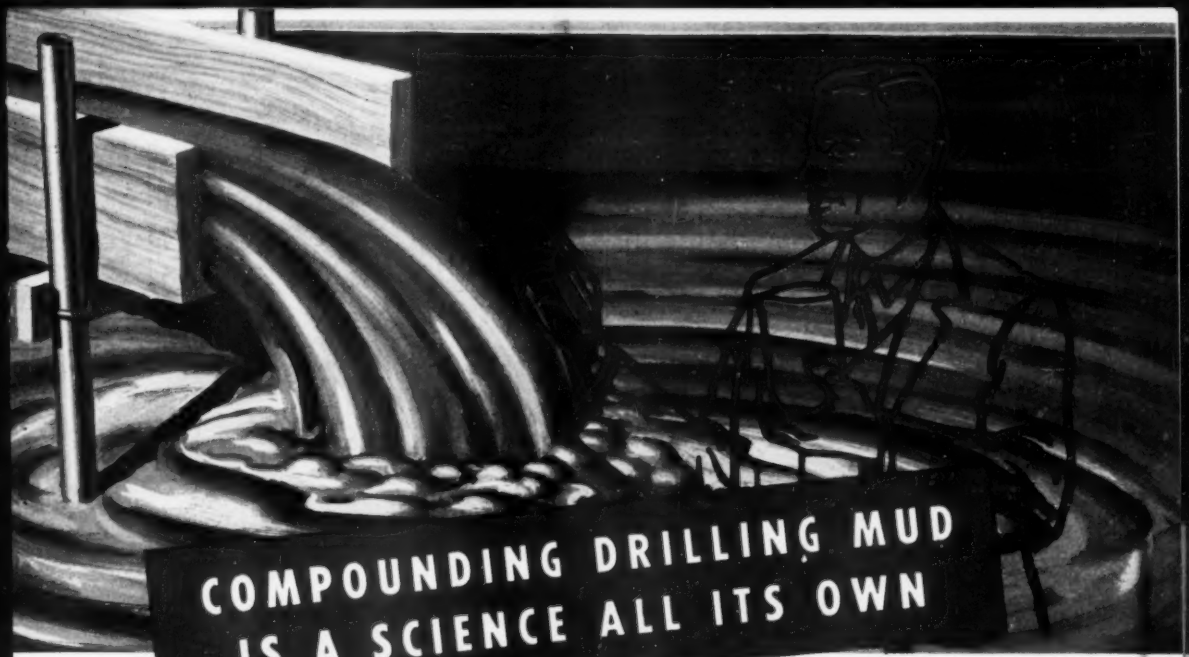
Cross-section of the Chapman Tilting Disc Check Valve illustrating the way that the balanced disc is supported on the pivot, with arrows showing the travel of the disc. A feature of the design is that the disc seat lifts away from the body seat when opening, and drops into contact when closing, with no sliding or wearing of the seats.

BECAUSE of the design of the balanced hinge-pinned disc, Chapman Tilting Disc Check Valves always close smoothly and quietly. There is no slamming, no hammering, no destructive pipe-line stress.

When open, the disc rides smoothly in the flow. As it closes, the effect of the stream on the short flap cushions the contact with the body seat. There is no sliding action and therefore wear on seats is reduced to a minimum. In addition, head losses are lowered as much as 65% to 80% over those experienced with conventional type check valves.

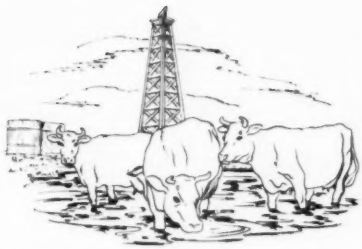
Available in either iron or steel.

The Chapman Valve Mfg. Co.
INDIAN ORCHARD, MASS.



COMPOUNDING DRILLING MUD IS A SCIENCE ALL ITS OWN

Through chemistry, modern drilling muds that throb through flow lines and play such a vital role in today's deep, high pressure oil wells have evolved into a complex, specialized science all their own.



As an example, the carefully compounded and controlled drilling muds used in deep Gulf Coast wells today are a far cry from the earth-and-water muds used in early discovery wells that established the Gulf Coast region as one of the world's most prolific, high pressure oil producing areas.

History records . . . and many an old-timer is still around to confirm it . . . that mud used in the Spindletop well was actually siphoned from a near-by mud hole, agitated by cows wallowing and tramping through the mire.

Drilling muds and chemicals have become an increasingly important part of the drilling operation. Drilling muds and chemicals to meet the multitude of problems encountered in today's deep, high pressure wells are developed in modern laboratories by skilled chemists. Each new chemical . . . each new refinement to drilling muds . . . is developed only after exhaustive research and tests.

Magcobar has met this challenge by providing the oil industry with a complete drilling mud and chemical service. This includes modern laboratories and skilled personnel for product development and quality control, and capable field engineers in laboratory-equipped cars with two-way radio to give prompt assistance at the rig.

Yes, through chemistry, modern drilling muds have progressed far beyond the earth-and-water stage. Look for the Magcobar sign when you need mud. There are more than 250 Magcobar dealers from Canada to Florida who are ready to serve you night and day with complete drilling mud service.

MAGNET COVE BARIUM CORPORATION, Malvern, Arkansas; Houston, Texas

Export Representative: Daniels, Beckley and Associates, 30 Rockefeller Plaza, New York 20, New York.

Look for this sign **WHEN YOU NEED MUD**

MAGCOBAR • MAGCOGEL • HIGH YIELD DRILLING MUD • XACT CLAY • FIBER-SEAL • MAGCO-MICA • TANNATHIN • JEL-OIL MUD • JEL-OIL "E" • SALT GEL • NOHEEV • SEAL FLAKES • MY-LO-JEL • CHEMICALS

Magcobar
Complete
DRILLING MUD SERVICE
DEALER

It's a Bigger, Better Bonus when you give it in Bonds

It's a *bigger* bonus when you give it in U. S. Savings Bonds. That's because Savings Bonds pay $4 at maturity for every $3 purchased. If it's a $75 bonus, for example, and you give the bonus in bonds, the employee receives—not a $75 Bond—but a *$100* Bond. And he *collects* $100 if he holds the Bond till maturity.

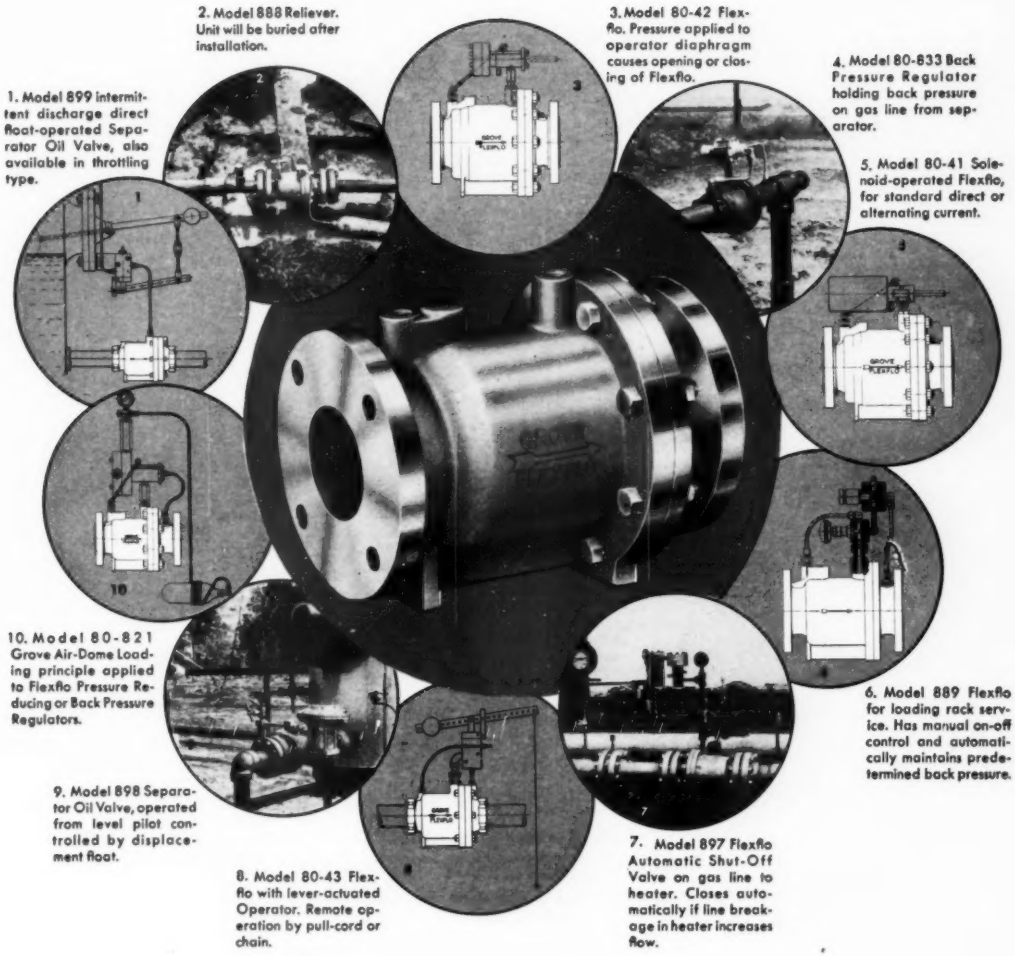
It's a *better* bonus when you give it in Bonds. It encourages saving among your employees—helps to make them more secure, more stable, more contented and productive on the job. (That's borne out in the more than 20,000 companies that make Bonds available to employes through the Payroll Savings Plan!) Another reason is that the more Bonds people hold today, the greater will be tomorrow's purchasing power—without which no business can prosper! Then again, Savings Bond sales aid the nation's economic security by spreading the national debt.

Thus you help your employees, your company, and the good old U. S. A itself—which means *yourself!*—when you give the bonus in Savings Bonds . . . and when you push the Payroll Savings Plan. All the facts and assistance you need are available from your State Director, Savings Bonds Division, U. S. Treasury Department. He's listed in your phone book. Why not ask your secretary to get him for you right now?

The Treasury Department acknowledges with appreciation the publication of this message by

THE OIL AND GAS JOURNAL
Tulsa 1, Oklahoma

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.



1. Model 899 intermittent discharge direct float-operated Separator Oil Valve, also available in throttling type.

2. Model 888 Reliever. Unit will be buried after installation.

3. Model 80-42 Flexflo. Pressure applied to operator diaphragm causes opening or closing of Flexflo.

4. Model 80-833 Back Pressure Regulator holding back pressure on gas line from separator.

5. Model 80-41 Solenoid-operated Flexflo, for standard direct or alternating current.

6. Model 889 Flexflo for loading rack service. Has manual on-off control and automatically maintains predetermined back pressure.

7. Model 897 Flexflo Automatic Shut-Off Valve on gas line to heater. Closes automatically if line breakage in heater increases flow.

8. Model 80-43 Flexflo with lever-actuated Operator. Remote operation by pull-cord or chain.

9. Model 898 Separator Oil Valve, operated from level pilot controlled by displacement float.

10. Model 80-821 Grove Air-Dome Loading principle applied to Flexflo Pressure Reducing or Back Pressure Regulators.

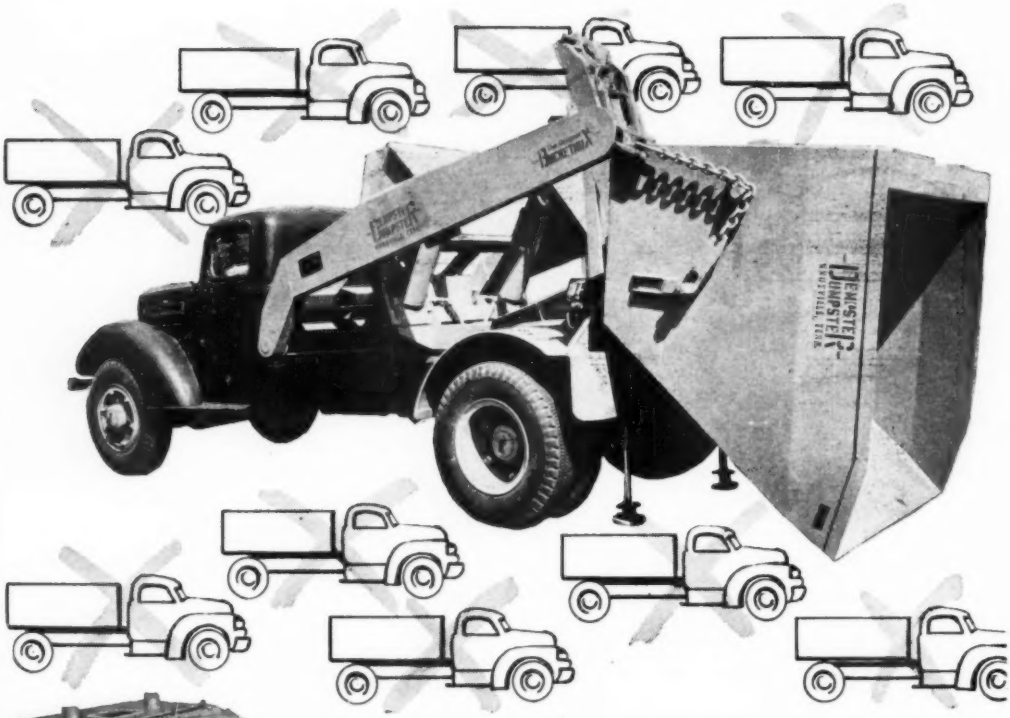
The Versatile GROVE Flexflo

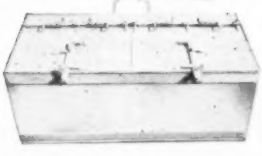
The heart of each unit shown here is the never-failing Flexflo Valve. Whether your control problem is simple on-off; pressure reduction or relief; holding back-pressure; automatic shut-off; continuous or intermittent separator discharge, or any of a score of other services, the Flexflo is the valve for the job. This flexibility is achieved through Grove's broad range of Operators. These Operators match and complement the Flexflo's ability to close bubble-tight, to resist corrosion and erosion, and to give the maximum of maintenance-free performance. Contact the nearest Grove office today for full details.

GROVE REGULATOR COMPANY
65th & Hollis Street, Oakland 8, California

3608 Navigation Blvd., Houston, Texas
310 Thompson Bldg., Tulsa 3, Oklahoma
1930 W. Olympic Blvd., Los Angeles 6, California
205 E. 69th Street, New York 21, New York

GROVE FLEX-FLO **REMOTE CONTROL VALVE**





WOULD YOU WRITE A LETTER FOR FIFTY THOUSAND DOLLARS?

A simple reply to one of our advertisements . . . a meeting of probing minds over the problems involved . . . the replacing of ten conventional trucks with only one Dempster-Dumpster truck unit and 99 containers . . . fifty thousand dollars annual savings for this one firm.

That, briefly, was the result of a simple inquiry for information about the Dempster-Dumpster System of materials handling.

A comprehensive Dempster-Dumpster survey revealed costly delays, unnecessary handling of materials, and much time wasted by loading crews. All were eliminated to the tune of $50,000 savings annually. Fast pick-up, hauling and dumping of pre-loaded Dempster-Dumpster containers replaced the old method of plant hauling. Ninety-nine detachable containers, built in over 20 sizes and designs for the specific materials they handle, were spotted at material accumulation points. Some are handled by fork trucks, others by overhead cranes within plant buildings. As containers are filled, the Dempster-Dumpster truck hoisting unit and one man, the driver, picks up each container, hauls it to its destination, dumps it and returns the empty container for refilling.

Pick-up and dumping of these detachable containers takes less than 60 seconds. The entire operation works to an on-the-run schedule. One truck hoisting unit handling 99 containers and doing the work formerly requiring ten conventional trucks. Let us bring you the complete details of the Dempster-Dumpster System.

Containers, in standard and special types, in capacities from 1½ to 10 cu. yds. are available. Whatever your materials are, be they heavy, light, bulky, dust, liquid, waste, raw or finished, you'll find a Dempster-Dumpster container ready, or custom built, to do the job more efficiently.

DEMPSTER DUMPSTER
TRADE MARK REG.
SYSTEM

DEMPSTER BROTHERS, Inc., 5119 Dempster Bldg., Knoxville 17, Tennessee

YOU GET

Precision results

WITH EASTMAN TOOLS AND INSTRUMENTS

EASTMAN can help you protect your drilling investment!

The use of our patented and proven removable WHIPSTOCKS and KNUCKLE JOINTS on your job will convince you that they are the finest scientifically-controlled directional tools available for your work.

For sub-surface surveying, the EASTMAN SINGLE and MULTIPLE SHOT surveying instruments are superior precision made equipment, designed for recording the deviation and direction of a well.

EASTMAN tools and equipment are Reliable—Safe—Fast and Economical. Our experienced engineers are prepared to assist you day or night in getting precision results in your drilling operations.

Literature on any of our services will be mailed upon request.

22 OFFICES FOR YOUR CONVENIENCE
(Consult your Local Telephone Directory)

Eastman

OIL WELL SURVEY COMPANY

DENVER • HOUSTON • LONG BEACH

"Oilwell" NICKEL-IRON Subsurface Pumps

Engineered for Economical Performance

THE "Oilwell" NICKEL-IRON Barrels are made from solid castings of fine grain nickel-alloy cast iron. They are bored from the solid so as to produce a sound working surface and then honed to a precision finish. They have the inherent corrosion and wear resistance of cast iron and are further improved by the addition of Nickel. The majority of pumping fields have either moderate corrosive fluids or destructive sand conditions and these pumps offer long life using the widest possible selection of accessories. The use of extension nipples permits the plunger to stroke out both ends of the barrel giving uniform wear and preventing formation of troublesome deposits in the barrel.

NICKEL-IRON STATIONARY BARREL ROD PUMPS

These pumps offer a dependable solution to the pump problems most generally encountered. By utilizing the large number of possible variations, these pumps cover an extremely wide field with exceptionally low initial and maintenance costs. They are available in 1⅜", 1¼" and 1½" bore and can be equipped with either metal plunger, cup valves, repack valves or combination ring and cup valves.

NICKEL-IRON TRAVELING BARREL ROD PUMPS

Many operators prefer the traveling barrel construction for various applications. It is available in the same sizes and plunger arrangements as the stationary barrel type. It can be equipped with double valves and seats, gas anchors and similar accessories.

NICKEL-IRON TUBING PUMPS

The "Oilwell" Tubing Pumps are supplied in many sizes and lengths of one-piece construction. The ends are either regular or reinforced—the latter provides added strength for deep-well service. Available for these pumps are many interchangeable parts, including gas valves, plunger extensions and oversize standing valves. Also, plungers—both pin-end and box-end designs—are available in a wide selection of materials and lengths. The interchangeability of this extensive line of pump parts makes it comparatively simple to adapt working barrels to various pumping conditions.

Consult your nearest "Oilwell" representative for additional information and ask for "Oilwell's" latest 94-page Pump Catalog.

Bored from the solid
Rough casting before any machine work is done
Rough casting bored
Finished NICKEL-IRON Tubing Pump Barrel with plain end
NICKEL-IRON Stationary Barrel Rod Pump with corrugated plunger and sand check.
NICKEL-IRON Traveling Barrel Rod Pump with corrugated plunger and seating assembly.
NICKEL-IRON Metal-to-Metal Tubing Pump with reinforced-end barrel, pin-end corrugated plunger with ball and seat at top, and regular 2-cup standing valve.

OIL WELL SUPPLY COMPANY

Branches Serving All Oil Fields

Executive Offices — DALLAS, TEXAS
Export Division Office
30 ROCKEFELLER PLAZA
NEW YORK 20, N. Y.

Division Offices — CASPER, WYOMING
COLUMBUS, OHIO . . . DALLAS, TEXAS
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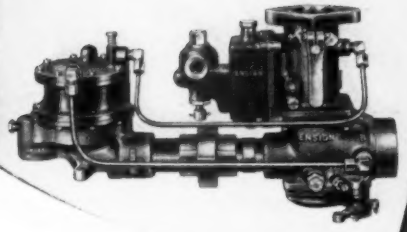
USS "OILWELL"

UNITED STATES STEEL

ENSIGN offers finest PRODUCT plus finest SERVICE



This Ensign Installation and Service Manual on Natural Gas and Butane-Propane Carburetion is available without charge to engine men.

SERVICE is a big word at Ensign's. Part of our responsibility, we feel, is keeping the ever-growing parade of oil field personnel well supplied with gas engine and carburetor information.

To do this we have produced a series of serviceman "helps" to better acquaint him with carburetion and gas engine problems. In separate bulletins combined into one Service Manual, each Ensign product is dealt with completely and simply from its principle of operation to servicing instructions including parts price list. All bulletins follow a standard format for easy reference.

To the engine builder and owner alike, Ensign service, slanted to the man in the field, means greater satisfaction and l... cost operation.

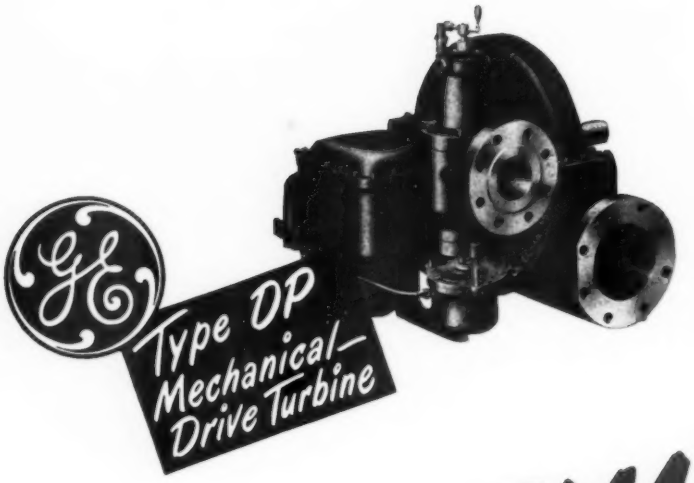
ENSIGN

CARBURETOR COMPANY

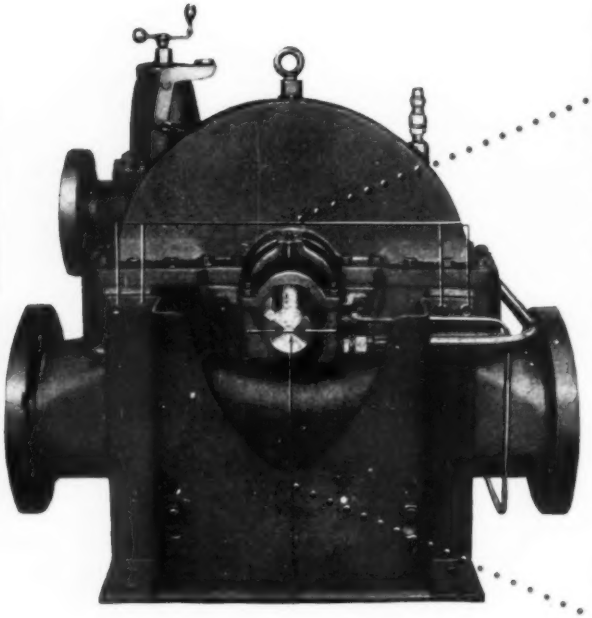
7010 S. ALAMEDA ST., P.O. BOX 229

HUNTINGTON PARK, CALIFORNIA

Branch Factory: 3208 West 50th Street, Chicago 24, Illinois



SAVE TIME ON



Turbines supported at the centerline save many mis-alignment headaches both during and after installation. In general, this method of support cuts down shaft "lift" from casing heating to less than a quarter of the lift of foot-supported units.

Thus, unless casing temperatures are high, G-E standard turbines can be lined up cold with the assurance that shaft lift will be within allowable limits when the turbines are heated. No calculations or adjustments for setting the shaft low when cold will be required.

With the unit in line hot or cold, shaft whipping, which often causes bearing burn-outs, excessive vibration, and coupling wear, is eliminated.

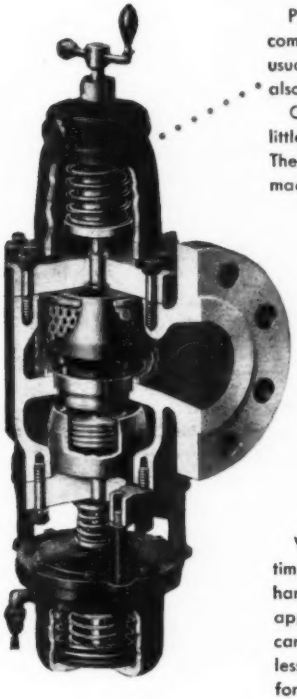
You save time when coupling the turbine to the driven unit, since the shaft height is identical on all G-E standard turbines. Not only that, but shaft diameter, keyway dimensions, etc., are identical on all turbine frame sizes. This standardization saves lost motion when installing or re-locating turbine drives.

INSTALLATION!

WITH GENERAL ELECTRIC STANDARD TURBINES

SAVING time when installing or re-locating turbines is one of the important advantages of using G-E standard turbines. Many other advantages: wider range governing, pressure lubrication, fewer wearing parts, are also standard with the Type DP —at no extra cost.

If you are planning installation of turbines, check with your G-E representative. He'll gladly give you application assistance and complete data. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*



Piping is simplified with G-E standard turbines. The combined trip-throttle valve—an exclusive G-E feature—usually makes a separate shut-off valve unnecessary. This also saves the cost of an extra valve.

Once installed, the combined trip-throttle valve requires little maintenance. There are no soft packings to replace. The steam strainer in the valve assembly is easily removed, made of Monel metal to resist corrosion.

With a new installation there's no need for you to spend time selecting spare parts it may be desirable to have on hand. This standard set of packaged spares contains parts applicable to DP turbines of all ratings. One set of spares can thus service several turbines. The price is very low—less than 25% of the price of a comparable set of spares for previous designs—thanks to standardization.

GENERAL ELECTRIC

three-point contact insures

smoothest operation

CP type C-1 Reaming Bits—for enlarging drill holes—have three cutters on ball and roller bearings. Especially designed cutter pockets provide exceptional strength—pilot bit is correctly spaced to guide the reaming bit properly—ample clearance around cutters allows rapid removal of cuttings. Unitized cutter assemblies welded in, with no bolts, nuts, or other loose parts to drop off in hole.

Type C-1 Reaming Bits are available in all popular sizes from $10\frac{5}{8}$" to 24". Prompt service is assured in the Mid-Continent and Rocky Mountain fields.

CHICAGO PNEUMATIC TOOL COMPANY

MANUFACTURED AT FRANKLIN, PA.

GENERAL & EXPORT OFFICES: 6 EAST 44th STREET, NEW YORK 17, N. Y.

Oil Tool Sales Office: One N. W. 16th Street, Oklahoma City, Oklahoma

When the erection of a plant gets underway—most of the gains from efficient construction technique have already been won—or lost! Ultimate savings are largely set in the *planning* of the construction program—as to methods, schedules and labor requirements.

At Lummus, this planning is derived from unsurpassed 'round-the-world experience. Then, it is put into practice by a field staff to whom so-called "unpredictables" are old and familiar.

Sound technique, as Lummus applies it, means a sound night's sleep for those we serve who shoulder the responsibility.

designs and builds with

economy
fulfillment
resourcefulness
teamwork
TECHNIQUE
perspective

TECHNIQUE— in planning

The full effect of detailed planning in advance of actual construction has been realized in foreign work where local facilities are at a minimum. It called for scheduled arrival of tools and materials, periodic estimates of manpower requirements and the preplanning of specific procedures for materials handling and heavy lifts. Economy in requirements for construction facilities, tools and equipment by preplanned re-use at various construction stages is one example. The selection of a supervisory staff with experience permitting effective reassignment as the job progresses is another.

TECHNIQUE— on the job

What makes it possibie to move a 150-ton derrick intact from one tower-erection location to another, as contrasted to disassembly and reassembly? Planning—plus practical experience of the field staff on the job! Lummus field personnel has served in some 15 foreign fields, as well as at home, and averages better than 10 years' Lummus experience.

TECHNIQUE— as to costs

From an analysis of unit erection costs in which every man-hour is estimated in advance, Lummus lays the groundwork for continuing cost control. Periodic reports, detailing costs and work-progress, permit evaluation of all phases of the job from start to finish.

THE LUMMUS COMPANY
420 Lexington Avenue, New York 17, N. Y.

LUMMUS

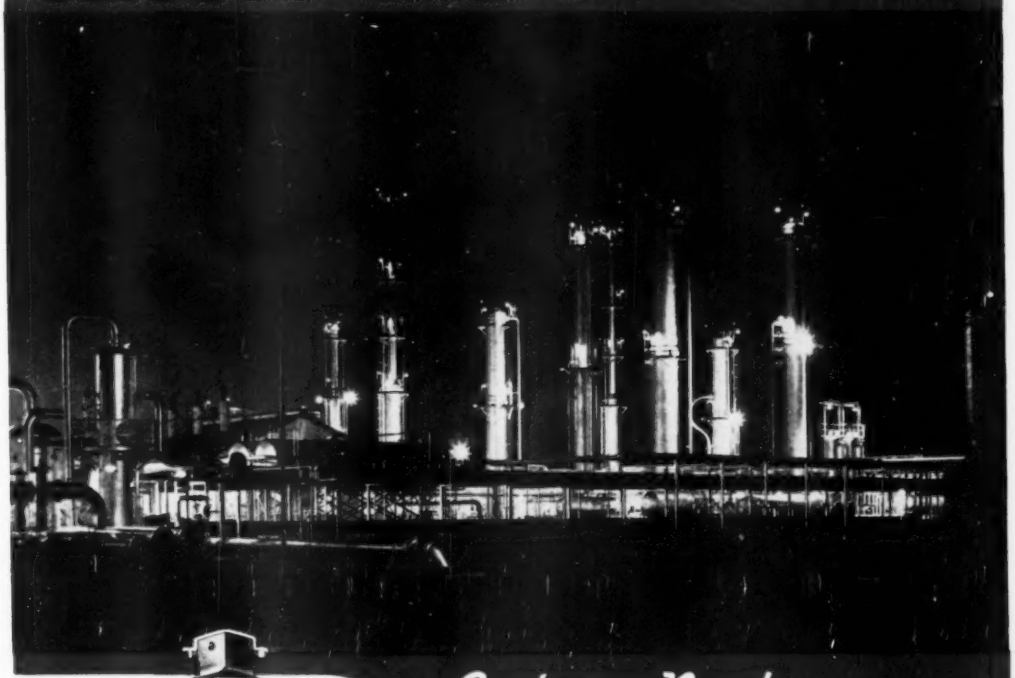
CHICAGO—600 South Michigan Avenue, Chicago 5, Ill.
HOUSTON—Mellie Esperson Bldg., Houston 2, Texas

The Lummus Company, Ltd., 525 Oxford St., London, W-1, England

Société Française des Techniques Lummus
39 Rue Cambon, Paris 1er, France

Compañia Anónima Venezolana Lummus—Edificio "Las Gradillas"
Esquina Las Gradillas, Caracas, Venezuela

CROUSE-HINDS



Hazardous areas in this plant are lighted by Crouse-Hinds EV Series Explosion-Proof and Raintight Lighting Fixtures

Explosion-Proof LIGHTING FIXTURES

. . . EXCEED the requirements for service in highly explosive atmospheres

To be safe for use in such locations, the fixture must operate at a temperature below the ignition temperature of the gas-air or vapor-air mixture. Also, the fixture must be so strong that it will resist internal explosions without damage and so tight that it will prevent the escape of flames or burning gases which might ignite the surrounding atmosphere.

Crouse-Hinds EV Series explosion-proof and raintight industrial lighting fixtures meet all of these requirements PLUS a wide margin of safety for extra protection.

Complete listings are in Crouse-Hinds Condulet Catalog.

Crouse-Hinds offers a complete line of explosion-proof and dust-tight lighting fixtures for use in hazar dous locations where fluorescent lamps are desired.

Type EVF 1, 2, 3, or 4-lamp

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

Offices: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas Denver — Detroit — Houston — Indianapolis — Kansas City — Los Angeles Milwaukee — Minneapolis — New York — Philadelphia — Pittsburgh — Portland, Ore. San Francisco — Seattle — St. Louis — Washington. *Resident Representatives:* Albany Atlanta — Baltimore — Charlotte — New Orleans — Richmond, Va. — Salt Lake City CROUSE-HINDS COMPANY OF CANADA, LTD., *Main Office and Plant:* TORONTO, ONT.

A Nationwide Distribution Through Electrical Wholesalers

CONDULETS • TRAFFIC SIGNALS • AIRPORT LIGHTING • FLOODLIGHTS

Control Underground Corrosion at Lower Cost

THIS NEW ALCOA BOOKLET TELLS:

- Where and why corrosion occurs
- How buried Anodes control corrosion
- Types of Alcoa Anodes
- How to install Anodes
- Where to get Alcoa Anodes

Magnesium
ANODES BY ALCOA

SEND FOR YOUR FREE COPY

ALUMINUM COMPANY OF AMERICA
625-L GULF BUILDING
PITTSBURGH 19, PA.

Please send me a copy of "Magnesium Anodes by Alcoa" on the control of underground corrosion.

NAME _____
POSITION _____
COMPANY _____
ADDRESS _____ STATE _____
CITY _____

ALCOA
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ANODES by ALCOA

They Say—

Buying Stock

"The Bartlesville chapter of Frank Phillips Men's Club recently did a very commendable thing when they devised and put into effect a stock ownership plan for local employes. The initial response to this worthy project was encouraging. I am told that the club received a number of letters from employes outside of Bartlesville asking if they could participate. The club now has decided to undertake as one of its main projects a company-wide program to encourage all employes — men and women—to own one share or more of their company's stock."

K. S. Adams, president, Phillips Petroleum Co., writing in Philnews.

Loading Record?

"A significant contribution to Jersey Standard's company-wide cost reduction program was made here last month when the supertanker Esso Montevideo was loaded in 6 hours and 20 minutes. This is believed to be a loading record for one of the new 26,000-ton tankers, not only here but at any petroleum terminal or refinery anywhere in the world."

Aruba Esso News, Lago Oil & Transport Co.

Big Investment

"Highly automatic, the cat. cracker (in the Lima refinery) requires a crew of only six men per shift. Valves which in other units have been turned by hand are here hydraulically powered and operated by push buttons in the control house. The battery of instruments on the control panels report virtually everything that is happening inside the unit and automatically control much of it. Thus a total staff of only 30 men, including supervisors, is required to operate this 11-million-dollar tool—an investment of $366,000 per man!"

The Sohioan, Standard Oil Co. of Ohio.

Bargain Price

"Petroleum prices generally are 40 per cent lower than they were in 1920, a postwar period like the present, while the average for all commodities is only 1 per cent lower.

"As compared with 1926, the Government's general commodity index is 53 per cent, while petroleum products are up only 10 per cent. The average worker's hour of labor will buy 5 gal. of gasoline today as against less than 4 in 1941. And we get in the regular grade today a better gasoline than we could buy at the premium price only a few years ago."

Conger Reynolds, speaking in Buffalo, N. Y.

Swifter Loading

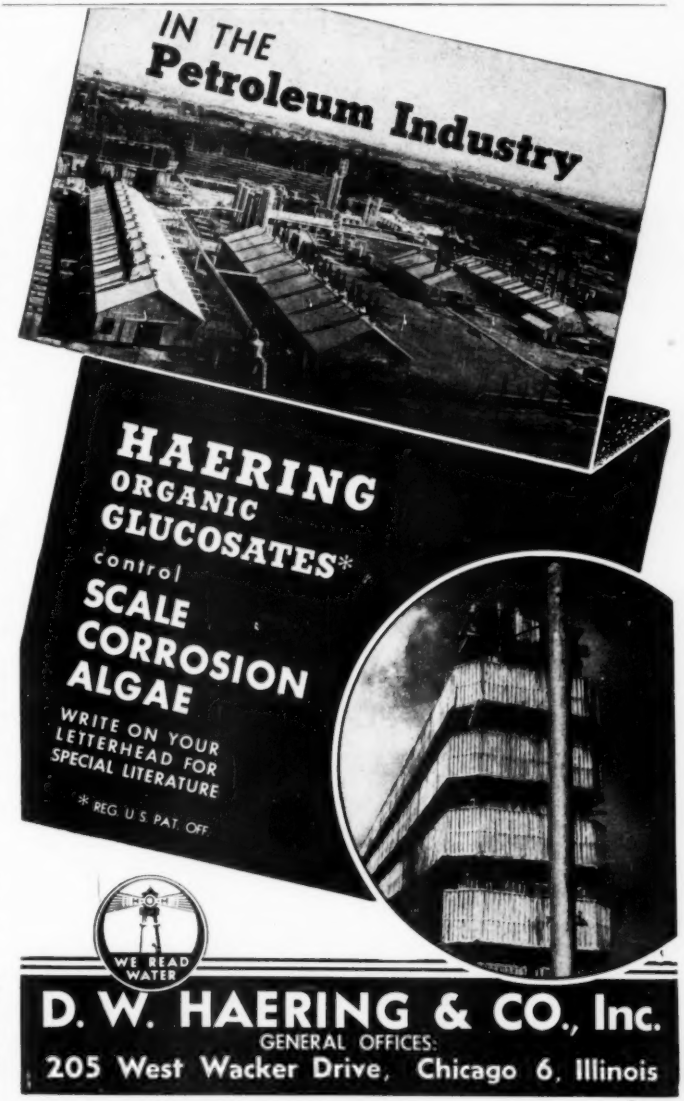
"While merely standing at anchor, waiting for dock space or a cargo, one of our big tankships will continue to build up expenses at the rate of $100 an hour or over.

"The recent installation at Avila (pump station, Port San Luis) of three new centrifugal pumps and a new 20-in. suction line for Santa Maria crude promises a considerable reduction in lost time and standby costs. The new pumps, each with a maximum pumping capacity of 5,000 bbl. an hour, have increased Avila's hourly loading rate by more than 3,000 bbl. to 15,000 bbl. an hour. Now two tankers can be loaded at one time whereas only one could be accommodated before."

On Tour, Union Oil Co. of California.

Training Engineers

"I think we will definitely see the day when engineering schools will include training in human relations as part of their curricula. The engineer must know not only his table of stresses and strains, the melting



points of copper and steel but also the boiling point of human tempers. And he should appreciate that it is as important to take the squawks out of people with a little praise and encouragement as it is to take the squeaks out of motors with a little oil.

"We must create in this country an industrial society which the worker likes and in which he believes. Otherwise, sooner or later, we are going to lose our vaunted free enterprise system just as others have lost it elsewhere. Communism and socialism are the penalties of economic ignorance."

H. G. Batcheller, president, Allegheny-Ludlum Steel Co., speaking at 125th anniversary celebration of Rensselaer Polytechnic Institute, Troy, N. Y.

Forgotten Man

"For a long time the worker who mans the machine was pointed out as the 'forgotten man.' Then, after an era of tremendous labor gains, the spotlight of attention shifted to the supervisors of the workers. They were pictured as being in a sort of limbo, neither enjoying the new-found gains of labor, nor the prestige of belonging to the management group. In most progressive companies supervisors now are receiving proper recognition for their work.

"Now we would like to advance a new candidate for the somewhat dubious honor of being the 'forgotten man.' The most forgotten man in industry today is the stockholder. The person who scrimps and saves to buy a few shares of stock in a business enterprise is almost never mentioned. His rights and contributions to our economy are rarely recognized."

The Link, Carter Oil Co.

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The Standard Torch, Standard Oil Co. (Ind.).

Government vs. Progress

"The cold fact is that in many South American countries where oil is known to exist under the land surface the government lays claim to the underground deposits. Of course, to an American oil company, it may make little difference whether the claimant of the 'royalty' is a farmer or the government—at least as far as paying the royalty is concerned. What is all important, is whether permits can be obtained easily from the owner of the surface, that is the farmer or free holder, or whether the government of the country asserting sovereignty insists on policing the job."

Bruce K. Brown, president, Pan-Am Southern Corp., speaking in Shreveport.

First or Nothing

"If the line (proposed gas-export pipe line) is an all-Canadian route, I don't care what company sponsors it. If the surplus is to be exported to United States, I am in agreement, but I say this government has no right to grant a charter to any company to go down through United States and then back into Canada with the tail-end in Vancouver. I ask the members from British Columbia to remember that when they vote."

George Cruickshank, member, speaking in Canadian House of Commons.

Lean Outlook

"Never in my 30 years in the oil business has the prospect for the continued existence of independents been less promising."

Guy I. Warren, president, addressing Texas Independent Producers and Royalty Owners Association, Abilene, Tex.

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JOURNALLY Speaking

But No Movie Stars

BUILDING a gasoline plant in the broomcorn-and-alfalfa crossroads of Maysville, Okla., caused the population to treble to 2,700 and created a problem in finding living quarters for plant employes and visitors. So, out in the "suburb" near the plant a frame hotel was thrown up which, it so happened, was ready for occupancy the same day that oil man Glenn McCarthy opened his fabulous Houston hostelry. The Maysville hotel has a different name, but to all oil men who have been there it will never be anything but the "Little Shamrock."

Underground Kilowatts

THE Department of State has just issued a book on "Energy Resources of the World," and the advance blurb arouses the suspicion that the electric power industry has been getting in some subtle propaganda licks. It seems that the striped-pants energy experts tossed out traditional method of measuring energy in British thermal units and reported the world's resources in "millions of kilowatt hours electricity equivalent." We are curious to know Oklahoma's oil and gas reserves in kw.—but not curious enough to pay $2.25 for a copy of the book in order to find out.

Oil versus Man

NEXT time somebody says the price of fuel oil is too high, tell him this:

F. G. Shoemaker, a General Motors engineer, figured out that 1 gal. of diesel fuel will do the work of eight men working 8 hours, and the cost is the equivalent of wages of 2 cents per man per day.

That makes oil look pretty good and man look pretty puny. But to even things up, Shoemaker added a plug for man as a machine, pointing out that he is a complete, self-contained, totally enclosed power plant, available in a variety of sizes and reproducible in quantity. He is relatively long-lived, has most major components in duplicate, and science is making rapid strides toward solving the spare-parts problem. He is weatherproof, amphibious, operates on a wide variety of fuels, enjoys thermostatically controlled temperature, circulating fluid heat, evaporative cooling, sealed lubricated bearings, audio and optical direction and range finders, sound and sight recording, audio and visual communication, and is equipped with an automatic control called a brain.

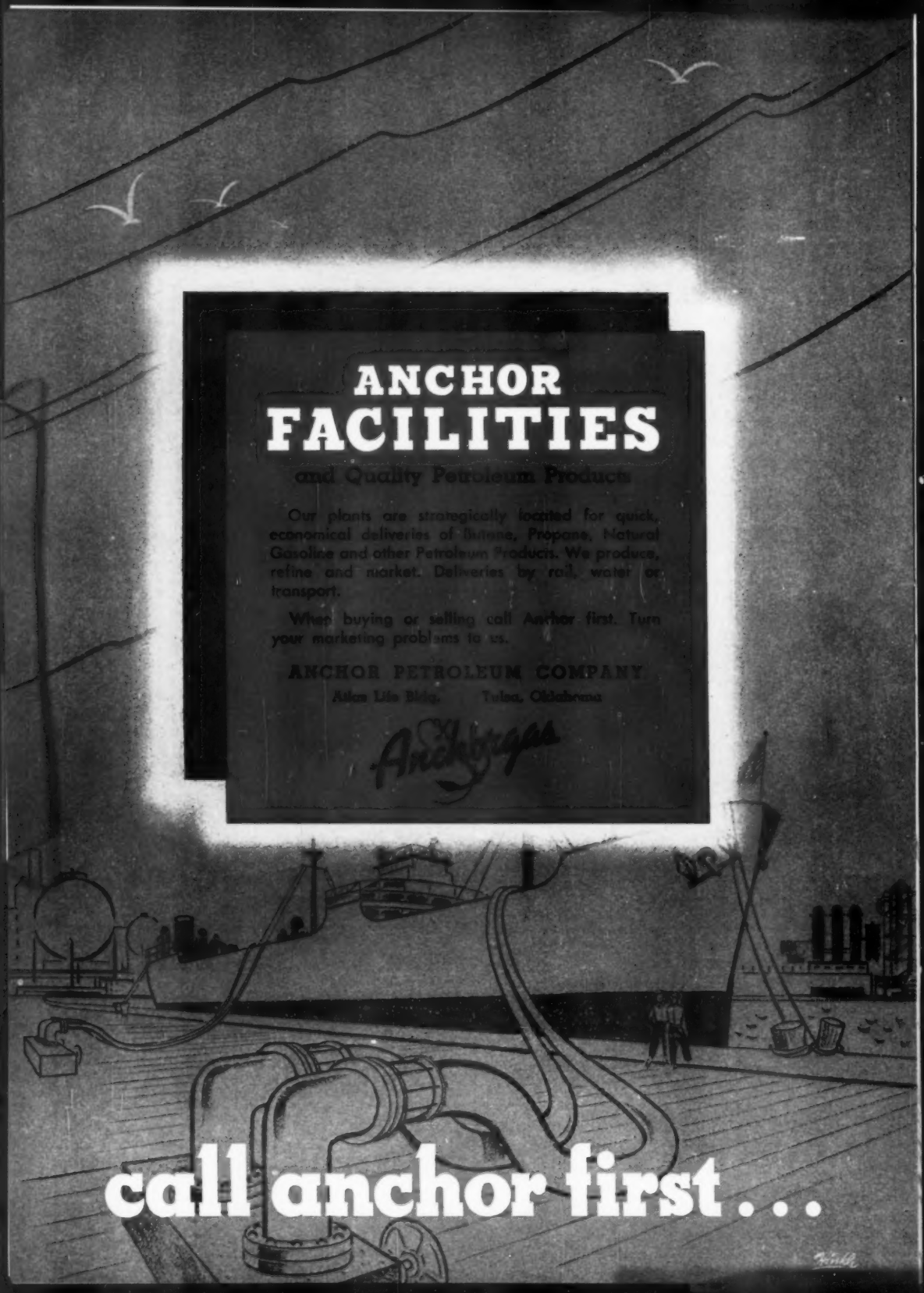
Fore!

OUT in Colorado the employes of the Rangely Gasoline Plant and of other oil companies in the vicinity must find time hanging heavy on their hands, for they built a golf course they call the Slush Pit Country Club in the rough ravines behind the plant. It has sagebrush for fairways, oil-soaked sand for greens, and slush pits and sump holes for hazards. Golf used to be considered too sissy a game for a rough, tough oil man before this modern college-bred generation came along, but apparently it is not yet strictly a gentleman's game at Rangely, for the "club's" scorecard carries the notation: "Play at your own risk. Not responsible for tick bites. No holds barred."

Self-Starter

DR. CHARLES F. KETTERING is credited with inventing the automobile self-starter, but according to the Automobile Manufacturers Association it really was invented in Europe. Only it never caught on over there because all European motorists had chauffeurs to do the cranking. When Ket brought out his model here it went over big because Americans had been doing their own cranking. We always believed that laziness mothered more inventions than necessity ever did, but probably the real moral of this story is that progress is achieved by people doing things to help themselves rather than by those who expect other people to do things for them.

—Henry D. Ralph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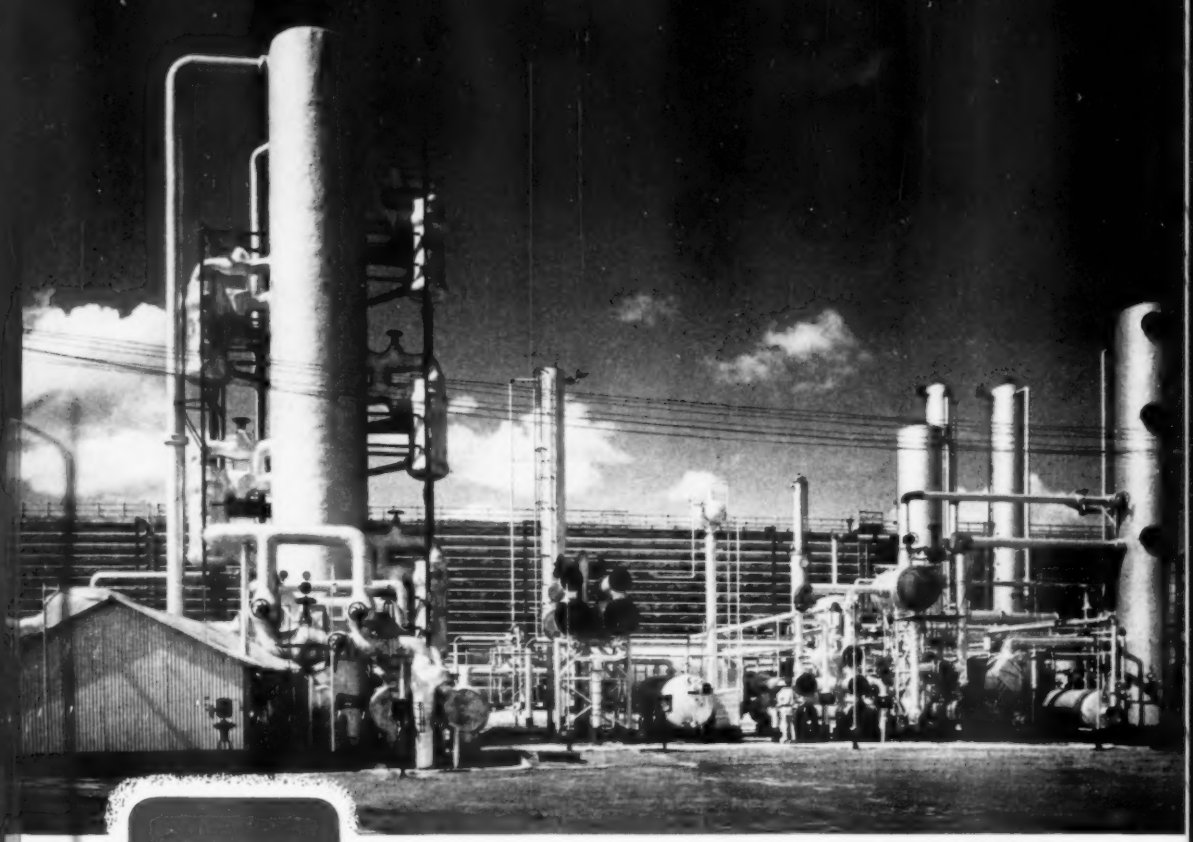

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Crude Oil, Natural Gasoline and Liquefied Petroleum Products

THE OIL AND GAS JOURNAL

"It's the Weather"

THE weather man is again taking most of the blame for unwanted developments in the oil business. The projected large increases in furnace-oil consumption have not materialized and there is other market weakness at some points. The usual explanation is "it's the weather."

The situation is reminiscent of prewar conditions in gasoline. The records will show that too often prices at refineries weakened in March and April at the start of the gasoline-consuming season. Mystified sellers looking for excuses were wont to point out that there had been "late snows in the North," and other unseasonable developments which had postponed the normal upturn in motor-fuel demands.

Actually in those years excessive accumulations of gasoline during the winter months rather than the usual vagaries of spring weather accounted for the unsatisfactory price trends which, unfortunately, because of the heavy stocks, usually continued through the summer months. The period of largest gasoline demand was over before refiners as a group got their house in order statistically.

The significance of weather in relation to all classes of fuel consumption is a postwar discovery. Lower-than-average temperatures were held accountable for the threatened shortages of the 1946-47 and 1947-48 seasons. Then a year ago, when supplies had increased and tanks were full, Old Sol rewarded refiners' diligence with a warmer-than-usual winter. Texas operators were asked to recall that fact as their production was cut back nearly 1 million barrels daily within a period of 6 months.

We are not prepared to argue with our statistical friends as to the accuracy of their projections of this season's furnace-oil needs, which so far have been disappointing. We are, however, quite sure that what has happened to the demands for all oils consumed as fuel this season and last goes deeper than the weather.

We have wondered with others if, with the available basic data, it is possible to project the domestic demands for furnace oils as accurately as is done in the case of gasoline. The figures on the number of oil burners in use come largely from those who manufacture and sell them. Observers are also asking whether sufficient consideration is being given to the widespread conversion in some areas of oil burners to natural gas. Some insist that the estimated consumption of oil per unit is too high.

We are not trying to minimize the increasing importance of furnace oils in petroleum markets. But the time has not arrived for them to become the dominant product in petroleum operations. There should be sufficient flexibility in manufacture and distribution, including sound storage programs, so that all divisions of the oil industry don't have to join the grain speculators and sellers of football tickets in studying weather reports to determine what is going to happen to their business.

These are some of the men active in the Dallas regional geophysical meeting, November 17-18. Seated, left to right, are Sidon Harris, past president, Fort Worth Geophysical Society; D. Ray Dobyns, Dallas, chairman of the program committee; L. L. Nettleton, Houston, past president, national S.E.G.; O. C. Clifford, Jr., president, Dallas Geophysical Society; Andrew Gilmour, Tulsa, president, national S.E.G.; K. E. Burg, Dallas, secretary-treasurer, national S.E.G.; W. T. Born, president, Geophysical Society of Tulsa. Standing, left to right, are V. R. Kerr, vice president, Fort Worth Geophysical Society; W. W. Newton, past president, Dallas Geophysical Society; R. W. Dudley, Fort Worth, program committee; Richard Brewer, Shreveport, vice president, Ark-La-Tex. Geophysical Society; A. E. McKay, past president, Dallas Geophysical Society; N. J. Christie, second vice president, Geophysical Society of Tulsa; and T. R. Shugart, secretary-treasurer, Dallas Geophysical Society

Methods of Finding Limestone Reefs Are Studied by S.E.G.

by Charles J. Deegan

DALLAS.—More than 1,100 exploration scientists, mostly geophysicists but including a heavy sprinkling of geologists, attended a regional meeting of the Society of Exploration Geophysicists here last week, mainly to compare notes on how to hunt for limestone reefs that might carry oil.

After 2 days of some rather frank talk, the concensus seemed to be that geophysical methods, primarily seismic, can find reefs and pin their location down reasonably well, but—and it's a big but—it is an extremely tough job in many areas.

In some areas, and unfortunately the rich eastern shelf of the West Texas Permian basin is one of these, seismic exploration for reefs is apparently an extremely difficult job. As a combination geological-geophysical problem, it isn't as bad as trying to locate stratigraphic trap pinchouts that ought to contain oil. But the difficulties and tough problems involved in hunting for reefs by seismic methods will often be of an order of magnitude a lot nearer those of hunting stratigraphic traps than they will be like the simple task of locating structures in an area of good reflections.

One thing nearly all speakers and observers seemed agreed upon. Successful reef finding efforts through the use of geophysical instruments will call for much closer coordination between the geologist and the geophysicist than anything that has prevailed as general practice up to now. This coordination will have to start

Digests of papers may be found on pages 132-134.

before the shooting party goes into the field and be practically continuous throughout the field work, as well as during the interpretation period following the field work. One veteran geophysicist, after listening to several speakers, remarked: "The district geologist and the party chief are practically going to have to sit in each other's laps from start to finish if they hope to come up with the correct answer."

Numerous slides were shown of areas where the draping, or compaction of sediments laid down on top of the hump of reef mass, was reflected in marker horizons above the reef, generally with diminishing effect as the thickness of the total sedimentary section above the reef increased. In some places these were marked, at others only faintly indicated by a slight increase in dip above the steep side of the reef. On the other hand, in some areas almost exactly the same effects in upper horizons were caused by a local area of hard sandstone, or even it was said, occasionally by an extremely hard shale. To make the problem even more complicated, many cases in West Texas were shown where the thick shale section immediately above the reef completely absorbed all compaction or draping effect.

On the subject of picking up reefs as a result of the increase in velocity of the energy waves through the limestone reef in contrast to a shale section surrounding the reef, most of those present seemed to agree that unfortunately the problem was seldom that simple. It was noted that frequently there were lime stringers, or often a thin bed of limestone a short distance above the reef and extending completely over the reef. These gave reflections that were often mistaken for the top of the reef.

Variations Found

In the eastern shelf area, variations of 200 ft. or more were often noted in the thickness of the Permian lime section from one area to another. If unknown, these variations could throw assumed velocities off sufficiently to mask the presence of a reef.

Consideration of some of the troublesome factors that could mask the reef reflection resulted in at least some of those present deciding that a highly porous reef might give a poorer seismic picture than a reef

with less actual promise as an oil prospect. If that is true, then some seismic prospects that are now labeled Grade "C," might actually be better bets than some that are now labeled Grade "A."

Perhaps the clearest picture of what was accomplished at the meeting was a general agreement something like this: A year ago we knew that we had a lot to learn about reefs, and that there was a lot we didn't know. Now we know specifically and in considerable detail, what some of the things are that we don't know, what some of the problems are that we will have to overcome. A year ago we suspected that in general we had a tough problem on our hands. Today we know a lot about just how tough some of the specific problems are.

Reef exploration in Canada from the standpoint of both gravity and seismic work was discussed in two papers. Owing to the fact that crown reservations adjacent to Redwater field are still open for competitive bidding at fancy prices, comparisons of geophysical results with later proven subsurface conditions were strictly limited, and both authors were "under wraps."

Nevertheless there was a rather frank discussion of some of the problems. It seemed obvious that careful, high-quality gravity work gave results that in some cases at least were amazingly close in control for a reconnaissance instrument.

Alberta Is Different

Seismic work in northern Alberta is an entirely different problem than similar work in the plains area. The bush and muskeg country, relatively rugged terrain, and heavily timbered areas complicate problems in many ways. The Dallas audience was told that it is advisable to study physiographic maps and break the territory up into sections with similar geomorphology. Each will require its own special seismic techniques. These can best be determined by making loop reconnaissance seismic surveys in each type of area. The fact that the country is only sketchily mapped does not make the problem any simpler.

There were many other papers on subjects other than reefs, and they were of unusual quality. But it was obvious that the crowd was there to hear and learn about reefs. They listened intently, and the meeting room was practically jammed at all times, despite the fact that there were more than 1,000 seats.

There was general agreement among those present that this meeting was a landmark, signifying that the organization of geophysicists had at last reached full adult maturity. The entire program was organized and put on by four local geophysical societies, all affiliated with the national Society of Exploration Geophysicists, and for the first time without any organized assistance from the older geological societies.

The four sponsoring units were: Dallas Geophysical Society, O. C. Clifford, Jr., president; Fort Worth Geophysical Society, Robert E. Klabzuba, president; Tulsa Geophysical Society, W. T. Born, president; and the Ark-La-Tex. Geophysical Society (Shreveport), Carl L. Bryan, president.

The general chairman of the program committee was D. Ray Dobyns of Dallas, assisted by local subcommittees, as follows: Dallas, E. D. Alcock, H. L. Cobb, C. G. Dahm, Patrick E. Haggerty, William B. Heroy, Sr., and R. A. Stehr; Fort Worth, Sidon Harris, Ray Dudley, S. K. Van Steenbergh, and James L. Morris; Tulsa, E. M. McNatt; and Ark-La-Tex., Richard Brewer. Other committees and their chairmen were: Publicity, T. R. Shugart, Dallas, with W. W. Clark of Shreveport as cochairman; advertising and finance, C. J. Donnally, Dallas; entertainment, H. C. McCarver, Dallas; arrangements, A. E. McKay, Dallas, and registration, Fred J. Agnich, Dallas.

Presiding officers over the various sessions were: O. C. Clifford, Jr., Dallas; Richard Brewer, Shreveport; George E. Wagoner, Shreveport; R. E. Klabzuba, Fort Worth; Sidon Harris, Fort Worth; N. J. Christie, Tulsa; D. Ray Dodyns, Dallas; and W. T. Born, Tulsa.

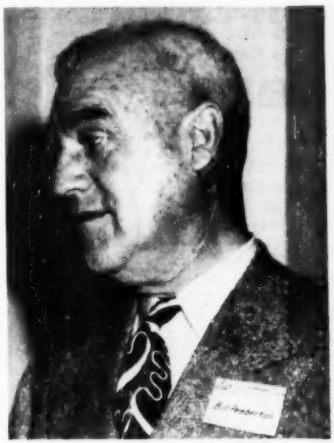
California Outlook Bright, Moody Says

LOS ANGELES.—Pessimists and those who have been "viewing with alarm" the future potentialities of California's oil resources have been overlooking a lot of facts that indicate a much brighter picture than has been generally painted.

Graham B. Moody of Standard Oil Co. of California, brought out this point with proof in the form of graphs, figures, quotations, and arguments in his paper "Recent Exploratory Results in California," at the joint Pacific Coast regional meeting of the American Association of Petroleum Geologists and Society of Exploration Geophysicists here last week.

A large attendance and a generally optimistic mood among the exploration scientists seemed to bear out Moody's contention. In the 2-day meeting there were some joint sessions and separate sessions for geologists and geophysicists in order to get in all the papers presented.

Digests of papers may be found beginning on page 134.



J. R. Pemberton, 1949-50 president of the Pacific section of the American Association of Petroleum Geologists, elected at the November 17-18 meeting in Los Angeles

In addition to discussion of several areas of California, there were two papers on Nevada, as well as reports on Western Canada and the Alaska naval reserve. Thinking on some of the basic concepts of oil accumulation was stimulated by a paper on the "Time of Oil Accumulation," by Dr. A. I. Levorsen, of Stanford University.

The feature of the geophysical session was a report on "Offshore Seismic Problems Affecting Geologic Evaluation" by Curtis H. Johnson, General Petroleum Corp., and Robert B. Galeski, Honolulu Oil Corp. This covered an extensive discussion of the joint offshore seismic operations of 14 oil companies, employing two crews for 13 crew months.

Regulations of the California Division of Fish and Game, designed to protect commercial fish supplies, made this joint offshore work necessary.

J. R. Pemberton, Los Angeles, was elected president for the coming year. Arthur S. Huey, Hancock Oil Co., Long Beach, was named vice president, and Milton W. Lewis, Los Angeles consultant, was elected secretary-treasurer.

Special Section on "Garvin County Plants" Starts on Page 59

New officers of the Rocky Mountain Oil and Gas Association are shown in this group picture made in Denver. Left to right are C. A. Lake, executive secretary; Jack Manning, Cody, Wyo., secretary; Glenn E. Nielson, Cody, president; J. F. Cullen, Casper, vice president; and C. S. Hill, Denver, vice president. Not shown is Gilbert Mueller, Denver, vice president

Oil Imports From Canada Not Imminent, Hewetson Declares

DENVER.—Canada has no plans for exporting crude oil to the United States at present, but may do so some time in the future, H. H. Hewetson, chairman of the board of Imperial Oil, Ltd., Toronto, declared in addressing the annual convention of the Rocky Mountain Oil and Gas Association here November 17-19.

Explaining that recent discoveries in Alberta have developed reserves of more than one billion barrels of crude, Hewetson said that lack of transportation keeps production there to 60,000 bbl. per day although the total Canadian market is close to 320,000 bbl. per day, but that by the spring of 1951 the pipe line now under construction to Superior, Wis., will move much of this crude to the head of navigation on the Great Lakes.

Still an Importer

"While we are projecting for the present that all crude oil moving through Superior will proceed in bond to Canadian refineries and do not contemplate at this time any exports of Canadian crude oil into the United States," Hewetson said, "you may be interested to know that Canada, in the year 1949, will import crude oil and finished petroleum products from the United States in an amount of approximately 130,000 bbl. per day. With United States exports to Canada of this magnitude, even if the new pipe line were to add pump stations and run to full capacity, the amount of crude oil immediately available for export to the United States would be considerably less than Canadian imports from the United States.

"The time will come, I feel sure, when exchanges of crude oil will provide an economic advantageous arrangement to both countries and will be used for bringing exports and imports between the two countries more into line; for example, areas tributary to the new pipe-line development in the United States would have an economic source of crude oil made available, while through existing channels of supply, crude oil and products from the United States could continue to be delivered to Canada."

Hewetson said that Canadian operators have by no means overlooked the West Coast as a prospective market and that thought is being given to a pipe line to that area.

The 3-day meeting was opened by Glenn E. Nielson, president of Husky Refining Co. and of the association, who emphasized the issue of Socialism versus free enterprise and declared that "now, more than any time in our history, America needs every citizen to weigh carefully the choice of roads."

This theme was also discussed by two other featured speakers at the convention, Walter S. Hallanan, president of Plymouth Oil Co., Pittsburgh, and James H. Pipkin, assistant to the chairman of the board of The Texas Co., New York.

Speaking on "Has Our Cooperative Effort Been Worth While?" Hallanan pointed to the achievements of the National Petroleum Council, of which he is chairman, saying: "The bold seizure by the all-powerful central Government of the oil resources beneath the California tidelands is a part of the pattern of centralized power that has been designed by those with a lust for governing. It was the first step in a campaign, which, unless stopped dead in its tracks will lead to government control of all property—inland as well as tideland—that can be construed as essential to national defense. And let us not forget that the fellows in Washington are going to do the 'construing' as to what is essential.

"Only last week, the vice president of the United States used the prestige of his high office to obtain nation-wide publicity for the specious theory that the Government must own the oil reserves of the tidelands in order for them to be available in time of war. It certainly has been demonstrated that Government does not have the key to the development of oil reserves. In the recent world war the only oil that was not immediately and continuously available was that which the federal Government had kept locked up. We all remember the Canol fiasco, which cost the taxpayers hundreds of millions of dollars and which never produced a barrel of oil."

Pipkin's subject was "Together—or not at all," and he declared: "Today the whole basis upon which the early Americans and their descendents have built the best life that mankind has ever known is under attack.

"All that we have to do to lose our freedom is to do nothing. There is grave doubt whether the United States will remain free or go Socialist. The Socialists who hide their socialism under other names are sitting in the saddle and they are driving hard toward the goal they have set."

New Officers Named

At the annual election of officers Nielson was reelected. Also retained as officers for the year were Charles S. Hill, Denver, and J. F. Cullen, Casper, as vice presidents. Newly elected vice president was M. H. Robineau, president of Frontier Refining Co. Jack Manning of Cody was elected treasurer. More than 400 members and guests registered for the meeting. J. P. Moroney, C. L. Pickett, J. M. McIntire, Gilbert Mueller, H. H. Arnold, L. L. Aitken, Jr., A. F. Barrett, J. L. Dougan, and R. P. Ryan were appointed to the executive committee for the association.

In closing the 3-day meeting the board of directors passed resolutions congratulating Oscar Chapman on his appointment as Secretary of the Interior. A resolution stating that "the Rocky Mountain Oil and Gas Association is unanimously opposed to competitive bidding for federal oil and gas leases for land not known to be valuable for oil or gas" was passed by the new directorate in further opposition to proposed regulation changes in the leasing of acquired lands.

_____this week

INTERNATIONAL—ECA survey shows refinery expansion of Marshall plan countries is boosting capacity close to 42,000,000 tons per year. . . . Other construction now under way. . . . ¶Imperial sells control of two Alberta companies. . . . ¶Jersey Standard forms subsidiary to take over tanker fleet. . . . ¶Brazil's NPC approves construction of 30-mile products line from the seacoast to the Sao Paulo industrial area. . . . ¶American Independent announces plans to begin drilling in Neutral Zone in December. . . .

TRENDS—Stocks of four major products decreased 2,043,000 bbl. for the week ended November 12, the first decrease since early in September. . . . Since the increase for previous week was 1,972,000 bbl., the difference in stock change for the 2 weeks was almost 4,000,000 bbl. . . . Only about 1,000,000 bbl. of this was due to decreases in refinery production. . . . The remainder is credited to increased demand and may well be the start of the steep upward trend that is normal for the season. . . . Indicated refinery demand for the week was about 11 per cent greater than the average for the 4-week period ended November 5. . . .

IMPORTS—Executives of leading importing companies present their views on foreign oil before House investigating group. . . . Subject expected to prompt long and bitter fight in next session of Congress. . . . ¶H. H. Hewetson tells R.M.O.G.A. imports may come from Canada eventually, but the time won't be soon. . . .

PIPE LINES—Portland Pipe Line Co. lets contracts for 134-mile, 18-in. line. . . . ¶Panhandle Eastern Pipe Line Co. acquires 60 per cent of outstanding stock of Trunkline Gas Supply Co. . . . ¶Texas-New Mexico Pipe Line Co. lets contracts for construction of 61 miles of crude-oil lines in West Texas. . . . ¶Cities Service Pipe Line Co. completes modernization of three pump stations. . . . ¶FPC schedules hearing December 7 on Transcontinental Gas Pipe Line Corp.'s proposal to expand capacity of its Texas-New York City line. . . .

NATURAL GAS—New Orleans is assured supply of natural gas as United Gas Pipe Line Co. signs contracts to supply projected 90-mile, 16-in. line with up to 150,000,000 cu. ft. daily. . . . ¶Ohio Fuel Gas Co. cuts by one-third the increase it is seeking on natural-gas rates in Ohio. . . . ¶FPC says it will rule before first of the year on distribution of gas by Panhandle Eastern Pipe Line Co. to its customers. . . . ¶East Tennessee Natural Gas Co. authorized to build 18-mile line. . . .

REFINING—Mid-Continent Petroleum Corp., Tulsa, using deep tanks in dry-cargo vessels to ship lube oils to East Coast. . . . Company says practice resulting in big savings over existing freight rates. . . . ¶Freedom-Valvoline Oil Co. places new filter plant in operation at its Freedom, Pa., refinery. . . . ¶W. C. Wenzel of Pennsylvania Grade Crude Oil Association tells Ohio Oil and Gas Association that industrial tranquility will expand demand for lubricating oils. . . .

Thanksgiving calls for the traditional turkey, and oil men abroad consider themselves no exceptions. Thousands of miles from home, these Grade A birds are on the last leg of their trip to the tables of Arabian American Oil Co. personnel at the Ras Tanura refinery. The camel-back trip was from the Ras Tanura pier to the commissary, which will serve Thanksgiving dinner to some 2,500 American men, women, and children

Gathered in Beaumont for their annual meeting last week, members of the Petroleum Electric Power Association elected the three men shown here as their 1949-50 officers. Left to right: T. E. Graham, Oklahoma Gas & Electric Co., Oklahoma City, secretary-treasurer; L. V. Dugas, Gulf States Utilities Co., Beaumont, president; and R. E. Patrick, Kansas Gas & Electric Co., Wichita, vice president

Pipe Lines a Big Market for Electricity, P.E.P.A. Is Told

by Leigh S. McCaslin, Jr.

BEAUMONT.—A huge potential market of 7.4 billion kilowatt hours per year in one branch of the oil industry alone was pointed out to electric power companies here last week.

Speaking at the twenty-first annual meeting of the Petroleum Electric Power Association, W. T. Thagard of Texas Eastern Transmission Corp., Shreveport, discussed the possibilities for the sale of power to pipe-line companies. Basing his calculations on the operations of his company, Thagard said that about 3 kw.-hr. is needed to deliver 1,000 cu. ft. of gas. Texas Eastern has a little more than 3,000 miles of 20-in pipe or larger, hence 370,000 kw.-hr. is used per year per mile of pipe.

Recent figures, Thagard continued, show that more than 20,000 miles of large-diameter pipe lines are either under construction, authorized, or planned. If the killowatt-hour factor developed above is applied to this 20,000 miles of line, a potential use of 7,400,000,000 kw.-hr. is arrived at.

The Texas Eastern engineer challenged his listeners by asserting that future use of electric power for pipe lines will be decided largely by its cost. He said that his company has demonstrated by actual operation the feasibility of using electrically-driven centrifugal compressors in transporting natural gas through high-pressure, long-distance lines. When additions are completed, which will be before the middle of 1950, Texas Eastern will have a total installed horsepower of 277,400 on the Big Inch system which it operates. Of this total, 188,500, or 68 per cent, will be in electric-drive centrifugal pumps. With the entire system in operation, the total demand will be an estimated 139,000 kw. and will require approximately 1,120,000,000 kw.-hr. annually. This figure is based on a 95 per cent capacity factor to deliver 325,945,000,000 cu. ft. of natural gas.

Thagard did not compare economy of operation of electrically-driven centrifugal compressors with reciprocating gas-engine compressors. However, another pipe liner on the program, H. H. Anderson, vice president of Shell Pipe Line Corp., Houston, did compare the costs of diesel and electric-motor-driven stations.

Anderson prefaced his cost figures with the remark: "Now that most pipe-line companies are limited by federal regulation to earnings of 7 per cent on fair value, the tendency in making decisions on prime movers for new lines is to compare all forecasted costs—capital and operating—over a 10-year period when making decisions." Basing his figures on modern large stations, electricity at 8 mils per kilowatt hour, and fuel oil at $2.65 per barrel, Anderson compared the 10-year costs of diesel and electric-motor-driven stations as follows :

	Diesel	Electric
Capital investment	26	13
10-year maintenance expense	8	2
10-year operating cost, except fuel and power	28	13
Oil fuel or electric power	38	72

In his talk, "Current Trends in Oil Pipe-Line Operations," the Shell vice president stated the trend briefly as "make'em bigger and larger." He added that another important trend is toward electrification where a power supply competitive to gas or diesel fuel is available. Anderson listed four things which pipe liners want most of electric power companies: (1) continuity of service, (2) good transmission-line regulation, (3) good service facilities, and (4) ready service man available.

Growth Cited

In his address, "How Electric Utilities Have Met the Demand for Power During the Postwar Period," E. L. Robinson, Beaumont division manager, Gulf States Utilities, highlighted the rate of growth of the electric utilities. He told his audience "in the 6-year period of 1946 to 1951, the privately owned, business-managed utility companies propose to add 21,000,000 kw. of capacity representing an increase of 52½ per cent over our capacity of 40,000,000 kw. on V-J Day This is a $9,000,000,000 expansion program. . . ."

Robinson deplored increasing governmental encroachment in the electric-utility field, stating that in 1932 government agencies owned only 6.8 per cent of the nation's installed generating capacity as compared with 19.8 per cent at the end of 1947.

"An Independent Operator Looks at Electric Service" was the topic chosen by L. H. Moon, vice president of Grace Oil Co., Houston. Moon said his company had found that in fields where they have electrified pumping leases, efficient operations have been maintained with half the number of pumpers formerly required. The Houstonian gave Grace's lifting costs per barrel of fluid from various depths down to 4,500 ft. in three fields as 1.4 cents and cost of electricity per barrel of oil sold in these same fields as 3.7 cents.

Manual Asked

Moon recommended that the power companies or electric-equipment manufacturers provide a simple, non-technical manual for every-day field use. Later in the meeting, C. L. McNeese, of Houston Lighting & Power Co. and retiring president, endorsed this suggestion as a P.E.P.A. project.

The growth and industrial development of the Gulf Coast area was covered by two speakers. John Newton, vice president and general manager, Magnolia Petroleum Co., Beaumont, discussed the Sabine-Neches area in a slide-illustrated talk. G. R. Walton, industrial engineer, United Gas Corp., Houston, covered the entire Gulf

Coast area with emphasis on the petrochemical industry. Walton expressed the belief that the Gulf Coast is now living in a "colonial economy." He said, "We make nylon salt but no nylon, rayon ingredients but no rayon, plastic bases but practically no plastics, synthetic rubber but few tires. In my humble opinion, this is the direction in which we should think."

In his address, "What Has Purchased Electric Power to Offer," A. R. Watson, vice president, Southwestern Public Service Co., Amarillo, cautioned that electric power is not a "cure all." He recommended that "before any broad statement is made about the economy of electric power, an intelligent study should be made of the application and selection of the equipment that is to do the job."

New officers of P.E.P.A. selected during the 2-day meeting were L. V. Dugas, Gulf States Utilities Co., Beaumont, president; R. E. Patrick, Kansas Gas & Electric Co., Wichita, vice president; and T. E. Graham, Oklahoma Gas & Electric Co., Oklahoma City, secretary-treasurer. Six new directors chosen included W. L. Pearson, Southwestern Public Service Co., Amarillo; John T. Meek, Arkansas Power & Light Co., El Dorado; Tom Mason, New Mexico Electric Service Corp., Hobbs; and Sam D. Salt, Texas Electric Service Co., Midland, and Dugas and Patrick.

Oil Topics to Highlight Regional A.C.S. Meeting

Several symposia on petroleum subjects, including many individual papers, will feature the fifth annual Southwest regional meeting of the American Chemical Society, to be held in Oklahoma City December 8-10.

Such topics as phase relationships, instrumental and noninstrumental methods of product analysis, petrochemicals, and the chemistry of drilling fluids will be covered during these symposia.

Papers to be presented during the meetings of special interest to oil-industry personnel are listed below.

FRIDAY MORNING, DECEMBER 9

Symposium on Phase Relationships of Hydrocarbons

"The Determination of the Critical Properties of Pure Hydrocarbons and Their Mixtures," by Webster B. Kay, Ohio State University; "Phase Equilibria of the Methane-Kensol 16 System to Pressures of 5,000 psi. and Temperatures to 260° F.," Michael J. Rzasa, Stanolind Oil & Gas Co., Tulsa, and D. L. Katz, University of Michigan; "Phase Relations of Hydrocarbon Hydrates," by Forrest F. Blankenship and James Whalen, University of Oklahoma; and "Oil Shale and Shale—Their Characteristics and Utilization," by H. M. Thorne, W. I. R. Murphy, J. S. Ball, K. E. Stanfield, and J. W. Horne, U. S. Bureau of Mines, Laramie, Wyo.

Sypmosium on Instrumental Methods of Analysis of Petroleum Products

"Instrumental Methods for Analysis of Petroleum Products," by B. W. Thomas, Humble Oil & Refining Co., Baytown; "Application of Raman Spectroscopy to Petroleum Chemistry," J. Rud Nielsen, University of Oklahoma; "Application of Polarography in the Petroleum Industry," Phillip W. West and T. S. Burkhalter, Louisianan State University; and "Rapid Instrumental Method for the Determination of Sulfuric Acid Content of Concentrated 'Black' Sulfuric Acid," Robert E. Price, Gulf Oil Corp., Port Arthur.

FRIDAY AFTERNOON

Symposium on Noninstrumental Methods of Analysis and Separation of Petroleum Products

"The Separation and Analysis of Petroleum Hydrocarbons by Adsorption," B. J. Mair, National Bureau of Standards, Washington; "Temperature Gradient in Solvent Refining of Lubricating Oils," E. J. Reeves, E. P. Hardin, and W. C. Arrington, Magnolia Petroleum Co., Beaumont; "Construction and Operation of a Two-Barrel Batch Stedman Fractionating Column," Robert A. Woodle, Gordon H. Miller, and G. H. Kesler, The Texas Co., Port Arthur; and "Processing Crude Residuum for Catalytic Cracker Feed Stock Commercially," E. Clarence Oden and Edward L. Foret, Cities Service Oil Co., Lake Charles.

SATURDAY MORNING, DECEMBER 10

Symposium on Chemicals from Petroleum

"Chemicals from Petroleum," J. E. Bludworth, Corpus Christi; "Sulfur Compounds from Petroleum Hydrocarbons—Reactions and Derivatives of Tertiary-Alkyl Mercaptans," W. W. Crouch and G. H. Short, Phillips Petroleum Co., Bartlesville; "Chlorination of Petroleum Hydrocarbons," George Hearne, Shell Development Co., Emeryville, Calif.; "Recent Developments in the Oxo Reaction," C. L. Levesque, C. H. McKeever, J. C. LoCicero, G. H. Agnew, and J. L. Rainey, of Rohm & Haas, Philadelphia; and "Metallo-Organic Surface—Active Agents from Petroleum," Warren L. Jensen, Continental Oil Co., Ponca City.

Symposium on the Chemistry of Drilling Fluids

"Colloidal Chemistry of Clays and Relationship to Structure," C. E. Marshall, University of Missouri; "Chemicals and the Types of Drilling Muds Resulting from Their Use," L. M. Hermes and Orien Van Dyke, Magnet Cove Barium Corp., Houston; "The Effect of Sodium Chloride, Sodium Hydroxide, Quebracho, and Sodium Carboxymethyl Cellulose Upon the Physical Properties of a Bentonitic Mud," W. E. Bergman and H. B. Fisher, Phillips Petroleum Co., Bartlesville; and "Statistic Relationships of Unusual Constituents of Montmorillonites," by J. A. Kornfeld, Sohio Petroleum Co., Oklahoma City.

Ten Papers Scheduled for A.I.M.E. Texas Meeting

HOUSTON.—Ten speakers have been scheduled to address the annual meeting at Texas A. & M. College December 8-9 of the Texas sections of the American Institute of Mining & Metallurgical Engineers.

Papers on the first day's program include: "Well Completion Fundamentals," by H. T. Kennedy, Texas A. & M. College; "New Type Gravel Pack Completion Method," Thomas S. West and A. A. Buchanan; "Drilling Mud and Its Relation to Well Completions," E. H. Lancaster, Jr., Magnet Cove Barium Corp., Houston, and R. L. Whiting, Texas A. & M. College; and "Jet Process of Perforating," R. H. McLemore, Welex Jet Services, Fort Worth.

On the second day's program are the following papers: "Some Preliminary Investigations of Quantitative Interpretations of Radioactivity Logs," R. E. Bush, Lane-Wells Co., Odessa; "Acidization in the Permian Basin," B. R. Weaver, Tide Water Associated Oil Co., Midland; "Results of Diamond Bit Coring," Robert Todd, Core Laboratories, Inc., Dallas; "The Time Factor in Cementing," Bruce Barkis, B. & W. Inc., Houston; "Squeeze Cementing Operations," George Howard and C. R. Fast, Stanolind Oil & Gas Co., Tulsa; and "Hydrafrac' Process Results," W. D. Owsley, Halliburton Oil Well Cementing Co., Duncan, Okla.

Louisiana Asks Jury Trial Before Supreme Court

WASHINGTON.—The State of Louisiana has asked the Supreme Court to take the unusual step of ordering a jury trial in the Government's suit for title to its offshore oil lands.

The jury trial was asked by Bolivar E. Kemp, Jr., Louisiana attorney general, in the event a motion for dismissal of the case is denied.

While such handling of suits is not unknown, one of the attorneys for the state said there have been only three jury trials before the Supreme Court.

Although the jury trials are limited to actions involving "citizens," Kemp told the court that in a case decided in 1876 in which it held that each state owns the beds of tidewaters within its jurisdiction, it announced the principle that "for this purpose the state represents its people, and the ownership is that of the people in their united sovereignty."

"This suit, insofar as it is an action at law," he argued, "involves title to the beds of tidewaters within the jurisdiction of the State of Louisiana. The state represents its people in claiming fee simple title thereto, and in denying title in the United States. The suit by the United States is, therefore, against the people of Louisiana who are its citizens. Hence, the State of Louisiana, defendant here . . . is entitled to a trial by jury and the motion should be granted."

Hearing on Leasing Policy Postponed Indefinitely

WASHINGTON.—Indefinite postponement of the hearing at Denver on revision of the Interior Department's leasing regulations has been announced by the Bureau of Land Management.

No reason was given for the postponement of the hearing, scheduled for December 1, but since Oscar L. Chapman is to be sworn in as Secretary of the Interior on that date, it is assumed the Denver meeting was put off for that reason.

A new date is expected to be set by Chapman after he takes office as secretary.

WASHINGTON WATCHING

BY BERTRAM F. LINZ

Labor Got a Bargain

WASHINGTON. — The American Federation of Labor has dug into the reports of the Federal Trade Commission and come up with the conclusion that 113 big businesses control all American industry.

It reached this determination by the simple expedient of taking the commission's figures on corporations with assets of $100,000,000 or over and its findings that in 19 of 26 major industries 6 or fewer companies control at least 60 per cent of the net capital assets in their industries, and extending the computation into the other industries which, strangely enough, include petroleum.

On that basis, it attributed control of the petroleum industry to 20 corporations which happen to meet the test of assets, but hundreds of smaller refiners will be quick to take issue with the A.F.L.'s assertion that "gas for your car comes from a big oil concern."

It's all part of a precampaign drive to round up the labor vote in anticipation of next year's elections, run by the A.F.L. through its subsidiary Labor's League for Political Education.

The same issue of the league's weekly paper that turned the whole oil industry over to 20 corporations also charged that "big business" lobbies spent $2,445,000 this year to influence Congress, and said the groups most active in this respect included the oil and gas industries. The major complaint seems to be that industry had 12 times as much to spend than did employe groups.

On the other hand, taking a quick glance over what Congress did and did not do during the last session it looks as though big business didn't get much for its money and labor got a pretty good bargain.

Nobody Will Be Happy

A SHOW-DOWN fight on oil imports looks like one of the first things to come up in Congress when it reconvenes in January.

The groundwork for a battle has been laid by the hearings of the House small business oil subcommittee and the constant needling of the State Department by the independent producers.

A National Petroleum Council committee is now studying the import question with a view to making a report at the first 1950 council meeting in January. So far, it hasn't made too much progress, and there is every indication that the committee will make no recommendations because of a sharp split in the industry.

There will also be a sharp division in Congress over any proposal to restrict imports. Members from the consuming states, whose interests lie in low prices, will line up against those from the producing states, where much concern is felt over the prospect of still further cutbacks in allowables as imports increase.

The effort to limit imports will also run up against a strong wall of administration opposition, partly because it would be contrary to the policy of opening our markets wide to foreign countries to aid their recovery and partly because of another policy of encouraging foreign development to the maximum degree. The contention of the State Department so far has been that imports have not harmed the domestic industry; should the contrary be demonstrated, it probably will argue that is one of the sacrifices that must be made in the interest of international amity and prosperity.

By the time the issue is settled, everybody concerned will know he has been in a fight. And no matter which way the decision goes, not everybody will be happy over the outcome.

A Really Closed Shop

THE Shah of Iran is in the United States looking for military aid and financial assistance for his "7-year" program of development but has made it plain that there is no chance for U. S. companies to participate in Iranian oil development.

In view of the fact that Iran locked up her oil reserves in order to keep the Russians out and sits in uncomfortable proximity to communist military forces along her border, the State Department is not pressing the Shah to talk about oil.

After the close of the war, the Russians attempted to secure, by concession or otherwise, and preferably otherwise, the oil reserves in the northern part of Iran. To keep the Russians out without making the intent too obvious, Iran enacted a law nationalizing the oil industry with the exception of the concession held by Anglo-Iranian Oil Co. and undertook to organize a government oil company. Max Thornburg, who was with the State Department during the war, now is in Teheran to set the company up for the government.

During his stay in Washington, the Shah was asked by a newspaper reporter what the chances were for the admission of foreign countries to the Iranian oil reserves.

"As you know," the Shah responded, "a law was passed 2 years ago and the oil industry is solely a national affairs, and only Iranian enterprises or the government is allowed to do any oil business."

Not only has the Iranian government locked up its reserves to prevent their being looted by the Russians, but it has made it a crime for an official even to talk to foreign oil interests.

Alphabet Scramble

COME another war, oil men may have to go into the wilds of Maryland to talk with whatever form of PAW may be set up and into the mountains of Virginia to see the WPB, with stops in between if they want the military, the OPA or some other agency.

Should Washington become the target of enemy attack, the Government structure will split apart like an exploding bomb and its components will come to rest in odd spots over a 40 or 50 mile radius, according to Defense Department plans which have been cautiously disclosed.

Into the 70 square miles that comprise the District of Columbia have been packed over the course of years almost all of the wide-flung activities of the federal Government, most of them housed in buildings so grouped as to offer attractive targets for enemy experiments in atom or guided-missile bombing. A single atom bomb hitting the mammoth Pentagon building could wipe out the Nation's military command—it's just across the river from Washington—and another "downtown" could knock out a dozen departments.

Just what the plans of the military are has not been revealed, but it is believed they call for scattering the government functions over the area adjacent to Washington rather than dispersing them throughout the country. An attack on the capital is seen as only a "possibility," but one which must be considered in the event of war, defense officials say.

Defense officials are planning only for their own departments, but in time of war many of the civilian agencies are so tied in to the military that it probably will be necessary to include them in any migration, and it is likely that only those departments least essential to the war effort would be left to take their chances in Washington.

Leading Importers Air Views On Foreign Oil at Hearing

by Dahl M. Duff

NEW YORK.—Top officials of eight large American oil companies appeared before a House small-business subcommittee here November 15-16 and presented a variety of views on the import question.

The companies represented are engaged in importing oil. The officials testifying endorsed the National Petroleum Council policy that imports should supplement, not supplant, domestic production. In general, they expressed disapproval of any government system to limit imports at this time.

The 2-day hearing brought out a number of interesting points relating to the foreign oil industry. It also showed the considerable concern over the possibility that dollar-produced foreign oil may be driven out of world markets by sterling production and that United States economic assistance to Europe may result in over-expansion in the oil industry.

Long-Term Contracts

As for imports, another point strongly emphasized by several of the officials appearing was that present individual-company import programs represent arrangements and contracts made several years ago during the oil-shortage period and that such programs cannot be changed on a short-term basis. There was general agreement that, at the present level in relation to domestic production, imports do not constitute any serious threat to the domestic industry, when all facts are considered.

At the hearing the subcommittee released replies made by the companies to a 36-point committee questionnaire sent out earlier and asking detailed information on petroleum imports and opinions from the companies on various aspects of the import problem.

The accompanying table is a consolidation of import data made by the subcommittee from the individual company replies. It shows that 11 large companies account for 91 to 92 per cent of all imports and that their 1949 programs call for a somewhat higher level of both crude and product imports than in 1948.

The hearings last week were conducted before Rep. E. J. Keogh (Dem., N.Y.). Counsel for the group is Otis B. Ellis. Companies represented by the witnesses appearing were Standard Oil Co. of California, Gulf Oil Corp., Atlantic Refining Co., Cities Service Co., Shell Oil Co., The Texas Co., Socony-Vacuum Oil Co., Inc., and Sinclair Oil Corp. Officials of Standard Oil Co. (N.J.) and Asiatic Petroleum Corp. appeared before the subcommittee last summer.

W. S. S. Rodgers, board chairman of The Texas Co., told the subcommittee that the workings of the normal economic laws will take care of any import problem and handle the relationship between imports and domestic producers. Legislation curtailing imports could lead to shortages and higher prices, thus penalizing 150,000,000 oil consumers in the nation for the benefit of 16,000 oil producers.

In his testimony, the Texas official outlined the company's various foreign interests. He emphasized the company spent large amounts of money developing oil supplies to meet demands during the shortage period, and that its major investment by far is in the United States.

Rodgers expressed himself strongly on the question of artifical restrictions against dollar-produced oil in foreign markets. As originally conceived, he said the European refining program was "completely unrealistic." He said California-Texas Oil Co., Ltd. (50 per cent Texaco) has worked out a plan and asked approval of British authorities under which it would sell for sterling and cut down its dollar outlay. As one example of the problem he said Caltex's Swedish affiliate had been endangered by sterling-oil expansion.

Officials of the Economic Cooperation Administration are aware of the problem of the American producers, and want to reduce the European expansion program, Rodgers said, but they are handicapped by government directives to cut down dollar requirements in Europe regardless of what happens to existing investments.

Volume Not Too Great

Standard Oil Co. of California was represented at the hearing by R. G. Follis, vice chairman of the board. He said that the company's belief was that the current volume of imports has not endangered the sound condition of the domestic industry and that this is shown by the continued high rate of exploration and drilling. He pointed out that total value of commercial oil exports in 1948 was $657,000,000 while the total value of imports was $240,000,000 below that figure.

"In 1949, our rate of production was close to 90 per cent of maximum efficient capacity," Follis said. "In the interest of national security alone it is my opinion that this figure should average no higher than 80 to 85 per cent, unless experience demonstrates that backing up of such reserves as protection for the military has the effect of diminishing the ability of the industry to maintain a vigorous program of exploration and development."

Follis said the most important factor limiting the economic feasibility of imports is the cost of transportation to the domestic market. Due to a temporary excess of tankers, he continued, current market rates for hauling Middle East oil to the United States are now low at about $1.10 a barrel. This, he said, is more than the production cost of most of the oil produced in the United States.

As for fears that foreign oil will be "dumped" into the United States, Follis said this is unrealistic. Foreign interests do not have the facilities to produce, refine, and transport large quantities of oil beyond their needs into the United States.

Middle East No Threat

Under questioning by the subcommittee, Follis said Venezuelan oil is as costly to produce as United States oil, and in addition must pay duty to enter the United States. Middle East oil, he said, won't ever be a major hazard to the United States but it is displacing Venezuelan oil from Europe. As for Canada, Follis said the costs of production were about the same as in the United States.

If it is found that foreign oil is seriously affecting the vitality of the domestic industry, then it will be time to take action, Follis told the group. The independents are not as well satisfied with their profits as they were 2 years ago but it does not appear this has affected the basic condition of the domestic industry.

A brief explanation of the position of Sinclair Oil Corp. was given by its president, P. C. Spencer. He pointed out Sinclair has a refining capacity of about 300,000 bbl. daily, only about 50 per cent met by the company's domestic production.

"Any question as to where Sinclair stands is answered by its recent announcement of plans for a major expansion of its domestic production," he said. "We hope by this program to increase our production 50,000 bbl. daily."

Spencer said it is suicidal to the domestic industry not to have some point at which imports are limited. "But don't ask me where this point should be," he added.

As for Canada, Spencer said it would be much easier geographically to get oil into Chicago, for example, from the Southwest than from Alberta. He said he did not see why a producer in Oklahoma, Texas, or Kansas would be alarmed about the possibility of Canada ruining his business.

IMPORTS BY COMPANY OF CRUDE OIL AND REFINED PRODUCTS (11 PRINCIPAL IMPORTERS) FOR 1948-1949*
(Figures in barrels daily)

	Crude oil			Refined products		
	1948	1949	4th Q. 1949	1948	1949	4th Q. 1949
Standard Oil Co. (N. J.)	104,900	93,500	90,000	79,400	108,500-118,400	130,267-169,967
Standard Oil Co. of California	13,273	17,209	19,721			
The Texas Co.	11,946	46,266	59,667	5,031	1,382	
Gulf Oil Corp.	74,244	92,409	117,827	8,801	2,429	
Shell Oil Co.	636	5,883	11,977	5,311	11,474	12,183
Socony-Vacuum Oil Co.	55,842	62,983	70,967	1,419	2,229	1,775
Standard Oil Co. (Ind.)	10,358	10,124	7,600	15,056	20,111	30,223
Sinclair Oil Corp.	24,595	25,928	32,533		524	2,097
Cities Service Co.	18,446	6,768	7,615		2,151	3,575
Atlantic Refining Co.	24,482	37,090	32,100			
Asiatic Petroleum Corp.	615			9,183	32,650	56,400
Total 11 companies	339,337	400,080	450,007	124,201	181,418-191,343	236,520-276,220

*1949 figures include company estimates for October, November and December.

The Sinclair president told the group that it should require a more precise definition of the term, "available supply." In a discussion of available supply, elements to consider are type of oil, location, price, and whether it is on a permanent basis. "If it's crude that moves every day from curb to curb looking for a better price, then it's not available," he said.

Dene B. Hodges, vice president in charge of transportation and supplies of Shell Oil Co., testified that the normal play of supply and demand is preferable to some kind of percentage limitation by government on imports. He also said import policy stems back to the shortages of 1947 and told how the company is now importing oil under a contract made in 1948 and first discussed in 1947. Some of this, he said, will be diverted to Canada when refinery capacity is completed there. Speaking generally on Canadian prospects, Hodges, the same as Rodgers of The Texas Co., foresaw the possibility in the distant future that a pipe line would move crude from Alberta to the Pacific Coast region.

He said no position had been taken by his company on the ECA-European expansion problem, adding, however, that it was not in favor of substantial overexpansion of facilities any place in the world. He also pointed out that refineries are built with future demands in mind and that there is tremendous room for expansion of oil consumption abroad. Under questioning, Hodges said broad policy for Shell was controlled by Royal Dutch-Shell as the major interest holder, but that Shell here in the United States was "not run from outside the country." He said it was conceivable Royal Dutch-Shell would ship any surplus foreign production to the United States but that he did not think this would happen.

Jennings Is Witness

B. Brewster Jennings, president of Socony-Vacuum, testified that the first 6 months of 1949 with its reduction in domestic production was basically a period of readjustment following the industry's successful efforts to overcome the shortage.

Jennings cited three fundamental factors to be considered in estimating the future supply-import trend. One is that there is no surplus of refining and transportation facilities. The second is that a rapid growth in oil demand is expected in foreign countries, exceeding 6 per cent per year.

"Third, even if all the necessary facilities are in existence, imports for meeting domestic demand would only occur (a) because they are necessary to meet a deficiency in supply as was the case a year ago or (b) because there is a financial inducement to import," Jenning said. "The first contingency requires no comment. As to the second, it is appropriate to point out that there is everywhere abroad a marked trend toward higher royalties, and that from the Middle East where the major potential production is, there is a transportation disadvantage for shipments to the U. S. Atlantic Seaboard of approximately 88 cents a barrel. So far as Socony-Vacuum is concerned, the oil we are now importing from the Middle East is pursuant to a contract made last year to help us in meeting a deficiency in supply. It is not a profitable contract as compared to purchasing domestic crude. We do not expect that so long as domestic crude is available in sufficient volume to supply our domestic demand, it would be financially beneficial to import Middle East oil."

Oversupply Temporary

S. A. Swensrud, president of Gulf Oil Corp., told the subcommittee Gulf's imports are based on plans made several years ago and that in the company's view the present oversupply of crude in the United States is temporary. He said Gulf plans to increase its imports of crude to a daily average of about 115,000 bbl. and level off at this point. Of this, he said 30,000-35,000 bbl. daily would come from Kuwait, and the remainder from Venezuela.

The Gulf president said production costs in Kuwait were of the order of 70 cents a barrel. He estimated tanker transportation to the United States East Coast was $1.25 to $1.50 a barrel.

Swensrud said it is possible the United States will face a shortage of oil unless imports are increased. He pointed out U. S. demand will increase 3 per cent annually over the next 10 years. "If by 1960, our consumption of petroleum products increases to eight million barrels daily, then . . . we would have to have proven reserves in the ground of around 34 billion barrels. . . . These are impressive figures which must give pause to even the most optimistic believers in the prospects for new oil discoveries in the country during the next 10 years. I am not that optimistic."

Robert H. Colley, president of Atlantic Refining Co., told the subcommittee that to date the operations of the company's Venezuelan subsidiary have been in the red. He said the oil was being brought in because it was necessary to pay off the investment in the subsidiary.

The Atlantic president said the nation's import policy should be designed to provide the public with petroleum products at the lowest cost. He expressed the opinion that the refiners rather than independent producers have been adversely affected by the general condition of ample supply of crude this year. "The reduction of producing allowables . . does not destroy the ultimate profits of producers and wildcatters," he said. "They simply retard the rate at which the oil, and profits, are recovered."

B. S. Watson, vice president of Cities Service Co., said the company was seriously concerned over the rising trend of imports but stressed in his opinion the problem will best be solved by studies within the industry than by government action. He said the company's imports are much lower this year, due to the drop in demand for heavy crude from Venezuela.

Compact Will Discuss Market Demand Statutes

Discussion of the legal and practical aspects of state statutes basing oil proration on market demand, and of pressure-maintenance and recycling projects as means of promoting ultimate recovery of oil, will be the chief topics of the annual meeting of the Interstate Oil Compact Commission in New Orleans December 5-7.

Participants will include S. L. Digby, Louisiana Department of Conservation; Ernest O. Thompson, Texas Railroad Commission; O. C. Bailey, Arkansas Oil and Gas Commission; Hiram A. Dow, attorney, New Mexico; Jeff A. Robertson, Kansas Corporation Commission; and Floyd Green, attorney, Oklahoma Corporation Commission.

Way Cleared for Water Flood in North Burbank

WASHINGTON.—Nearly 3 years of negotiations between the Interior Department, the Osage tribal council and a number of holders of oil leases have been wound up with the signing of a blanket oil lease and operating contract covering the water flooding of the 22,000-acre North Burbank unit on the Osage reservation in Oklahoma.

The largest water-flood operations in the world, the department said that because of the depth and other novel features, the development "will be watched with interest by the international petroleum industry."

The North Burbank unit has produced 169,000,000 bbl. of oil since the original lease in 1920, and estimates of future recovery by the water-flood process range from 140,000,000 to 165,000,000 bbl. The water-flood reserves have an estimated present day worth of $375,000,000, and the development costs are expected to amount to $50,000,000.

The unit is held under 137 separate leases by 14 corporations and 6 individuals. The leases call for a royalty of one-sixth of the production to be paid to the Osage tribe, and the new lease, providing for unit development, continues the one-sixth royalty on production up to 20,000,000 bbl., the quantity of oil it is estimated might be recovered without water flooding, and calls for a royalty of one-eighth on the additional oil expected to be recovered. It is estimated that 25 to 30 years will be required for complete depletion of the field by the water-flood process.

While there was agreement on the part of the department and the industry that a single, coordinated program for secondary recovery through unitization was desirable, there was considerable difference of opinion over details. The contract finally arranged was a compromise agreement, the department said.

"Under the conditions, plus the uncertainty as to the future trend of crude-oil prices, the inability to predict with any degree of accuracy the trend of business conditions in the oil industry over the next 20 years, the need of the Indians for increased royalty income, and their natural desire for prompt flooding development, the Geological Survey is of the opinion that the proposal of the operators should now be accepted," it was explained.

Oil Loan to Mexico Still Subject of Negotiation

WASHINGTON.—Rep. Robert Crosser of Ohio, chairman of the House Interstate Commerce Committee, went to the White House last week to discuss various matters with President Truman, later disclosing that the Mexican oil loan was one of the subjects talked about.

Reportedly, but without any confirmation in Washington, the embassy at Mexico City is exploring the possibilities of a loan with Mexican authorities. Crosser, however, has felt that the State Department has been delaying negotiations, a sentiment shared by Rep. Charles A. Wolverton of New Jersey, ranking minority member and former chairman of the committee, who has a resolution in Congress for an inquiry into the situation.

Iraq Petroleum Names Cunningham Chairman

Admiral of the Fleet Sir John Henry Dacres Cunningham has been elected chairman of Iraq Petroleum Co. and its affiliates to succeed Sir Francis Humphrys, who retired recently after holding the post 8 years.

CUNNINGHAM

Cunningham in 1941 was appointed fourth sea lord and chief of supplies and transport, and as such was a member of the oil-control board and responsible for planning oil supplies for the North African invasion.

Earlier he had served as a member of the Middle East subcommittee of the Imperial Defense committee and was closely connected with Middle East oil developments preceding construction of the Iraq-Mediterranean pipe lines.

Texas Oil-Severance-Tax Income Far Below 1948

AUSTIN.—Income from the severance tax on crude oil, the state's largest single source of income, is lagging behind last year.

It is now running at the rate of $75,000,000 a year as compared with $98,000,000 for last year. Severe cuts in the state's monthly allowables during the current year are the reason for the reduction.

Barnsdall Merger Dropped

Plans for merging Barnsdall Oil Co. and Ogden Corp. have been dropped as a result of studies indicating that the transaction could not be concluded as a tax-free reorganization, officials of the two companies have announced. Controlling stock of Barnsdall is owned by Ogden and its parent, Atlas Corp., an investment trust, which proposed last September that Ogden dispose of its other interests and merge with Barnsdall.

Middle East Oil-Price Panel to Meet Again

WASHINGTON.—Following conferences with representatives of the companies supplying Marshall plan oil from the Middle East, Dr. Oscar E. Bransky, acting director of the petroleum branch of the Economics Cooperation Administration, has called another session of the price panel which met here November 1-2.

The panel will meet December 16 for further consideration of its recommendation regarding price differentials on products, and the companies may be permitted to appear before the group to give their views on the recommendation. The discussion will be limited to the question of product prices, no recommendation having been made to ECA regarding crude prices.

ECA officials have withheld the details of the panel's recommendation, explaining they did not wish to make them public until they had been "finalized," but there were indications that the companies were presenting objections to the original suggestions.

The panel consists of Max W. Ball, former director of the Oil and Gas Division; L. S. Wescoat, president of Pure Oil Co.; Sumner Pike, member of the Atomic Energy Commission; Dr. Edward S. Mason, dean of the graduate school of public administration at Harvard University; and Dr. George W. Stocking, professor of economics at Vanderbilt University.

55 Per Cent of ECA Oil Moving in U. S. Tankers

WASHINGTON.—Requirements of the Economic Cooperation Act that at least 50 per cent of the European Recovery Program goods moving from the United States be transported in American bottoms are being met in the case of oil, it was reported this week by the ECA public-advisory board.

The board reported that between April 3, 1948, and June 30, 1949, total tanker liftings in the United States were 433,835 tons, of which 239,891 tons, or 55.3 per cent, moved in American-flag vessels.

The report showed that 33,922 tons of petroleum was shipped from the United States to the Scandanavian countries, 9,381 tons of it, or 27.7 per cent, in U. S. tankers; 216,148 tons to the United Kingdom of which 132,183 tons, or 61.2 per cent, was in our vessels; 175,683 tons to Belgium, Netherlands, France, and Germany, with 98,227 tons, or 55.9 percent, under the American flag, and 8,082 tons to Austria and Italy, of which only 100 tons or 1.2 per cent, moved in U. S. vessels.

International

WORLD-WIDE OIL DEVELOPMENTS

Survey Shows ERP Countries Nearing Refinery-Capacity Goal

WASHINGTON.—The Economic Cooperation Administration has released the first report on coordination of oil-industry expansion in the Marshall-plan countries, which was prepared by the Organization for European Economic Cooperation in Paris in October.

On the basis of that report and information available from ECA and nongovernmental sources, an evaluation can now be made of Europe's progress in expanding her refinery industries.

Starting out with a capacity of approximately 24,000,000 metric tons a year, the ERP countries already are approaching the 42,000,000-ton capacity which ECA experts held last year was the desirable level with construction of some 7,000,000 tons of capacity with Marshall-plan aid and 10,000,000 tons by private capital. In addition, several countries are going ahead with construction of another 9,000,000 tons capacity, for which they hope to secure ECA funds but will build anyhow. *(Metric tons per year divided by 50 gives round figure for barrels per day).*

Overexpansion Feared

All told, approximately 50,600,000 tons of capacity is thus accounted for. The OEEC gave approval "in principle" to a 62,400,000-ton program out of a total of 65,300,000 tons originally contemplated by the Marshall-plan countries, and it is in this top 12,000,000 tons capacity that ECA officials see the possibilities of overexpansion which would create large surpluses of refined products that would lead to unnecessary and intensive marketing competition.

The OEEC program is based on the assumption that European requirements will increase at the rate of 9 per cent a year over the period of the European Recovery Program and "will continue to rise after 1952-53, necessitating the building of further capacity," the Paris group said in its report. The ECA here is doubtful whether consumption will increase at a rate greater than 6 per cent a year in the near future, and officials refuse to speculate on when the curve of rising demand will begin to flatten out. Given conditions of peace and prosperity, the trend should continue upward, it is agreed, but there are many factors which might affect that trend.

The European program does not take into consideration any new refining developments in the Middle East where some substantial expansions have been proposed. Two projects are reported to have been brought to the attention of ECA, but no applications are now pending and no definite policy with respect to middle East expansion has yet crystallized.

The OEEC report was based on country studies leading to the following conclusions:

Austria: Consumption, 391,000 tons in 1948, is expected to reach 520,000 tons in 1952-53, which can be met from home refineries processing 620,000 tons yearly of crude oil supplied entirely from indigenous production, but in view of the type of crude from the Austrian fields it must be expected that if Austria meets her needs of white products from home refining a surplus gas/diesel oil will develop.

Belgium-Luxembourg: Inland consumption is expected to increase from 3,731,000 tons in 1948 to 4,723,000 in 1952-53 and the refinery program calls for a throughput of 8,258,000 tons, which would create a surplus for export of which some 600,000 tons might not be readily disposed of.

Denmark: Consumption is estimated to increase from 1,053,000 to 1,681,000 tons. The one refinery in the country has a throughput of about 30,000 tons of crude a year, producing mainly bitumen, and the long-term program includes the erection of a new 800,000-ton refinery designed to meet nearly half the country's requirements but has not been finally decided upon. Denmark's requirements in 1952-53 are expected to be met by the import of 30,000 tons of crude from nondollar sources and 1,777,000 tons of products of which 324,600 tons will be from dollar sources.

France: Consumption is expected to increase from 6,701,000 to 12,915,000 tons between 1948 and 1952-53 and refinery throughput is to increase from 7,500,000 to 18,775,000 tons, giving an output of finished products of 17,135,000 tons which will be close to requirements of the homeland and the overseas territories. The original French program called for a capacity of nearly 24,000,000 tons, later reduced to 18,800,000 tons. The OEEC raised questions as to the intention to supply overseas territories by systems of exchange, which it pointed out presupposes that 700,000 tons from home refineries will find an outlet in neighboring countries where, in many cases, there are already programs for refinery expansion; the long-term exchange arrangement with supplying companies also may be difficult to effect on commercial grounds.

Greece: Consumption will increase from 744,000 to 968,000 tons and it is proposed to build the country's first refinery, to have a capacity of 400,000 tons a year, which would meet about 35 per cent of the requirements.

Iceland: Consumption is expected to increase from 98,000 to 146,000 tons, and the import program for 1952-53 calls for the purchase of 253,000 tons of which 57,000 would be from dollar sources.

Ireland: Consumption will increase from 457,000 to 639,000 tons to be met by imports, of which 207,700 tons will be from dollar sources.

Italy: Consumption will increase from 2,761,000 to 6,229,000 tons, and refinery production is to be increased from 3,100,000 to 7,329,000 tons. As the plants would be required to produce large quantities of fuel oil to meet the consumption estimates, a temporary surplus of white products is foreseen, to be exported to nonparticipating countries. The OEEC, however, raised the question whether the reerection in Sicily of a secondhand refinery of 315,000 tons purchased in the United States is in line

with the pattern of consumption requirements.

Norway: Consumption is expected to increase from 1,193,000 to 1,826,000 tons. The country has one refinery, of 35,000 tons capacity, and will meet requirements by imports of 1,795,000 tons of which 545,000 will be from dollar sources.

Portugal: Consumption will increase from 535,000 to 703,000 tons. The country's one refinery now processes 300,000 tons of crude a year and will be expanded to 370,000 tons by 1952-53 and eventually to 460,000 tons, including a catalytic cracking unit of 150,000 tons which the OEEC believes is too large. The 1952-53 import program calls for 370,000 tons of crude of which 140,000 tons will be dollar oil and 501,100 tons of products of which 160,800 tons will be from dollar sources.

Sweden: Consumption will increase from 2,958,000 to 3,815,000 tons. One refinery operated in 1948 with a throughput of 550,000 tons of crude and a second is under construction, eventually to have a capacity of 1,000,000 tons and a third has been proposed, with a capacity of 500,000 tons. The 1952-53 imports are estimated at 1,540,000 tons of crude, 540,000 of it from dollar sources, and 2,513,000 tons of products, 879,300 tons from dollar sources.

Turkey: Consumption will increase from 339,000 to 740,000 tons, and recent discovery of the Famandag oil fields has led to consideration of a 1,000,000-ton refinery to be connected to the fields by pipe line. No final decision has been made by the Turkish Government, but the OEEC believes the project would be a costly venture, particularly as it held doubts as to whether the proposed consumption levels would be attained. The 1952-53 import program calls for the purchase of 844,500 tons of products, 584,500 tons from dollar sources.

United Kingdom: Consumption is expected to increase from 13,363,000 to 18,399,000 tons, which includes a 100 per cent increase in the use of fuel oil (to be 5,200,000 tons in 1952-53). The program calls for the development of existing plant or the construction of new units which will be able to process nearly 19,500,000 tons in 1952-53, against 5,500,000 in 1948, with a yield of 17,300,000 tons of products, covering about 80 per cent of total requirements. The 1952-53 import program would include 19,199,000 tons of crude, of which 6,671,000 would be dollar oil, and 4,734,000 tons of products, of which 908,000 would be from dollar sources.

Trizone Germany: Consumption is estimated to increase from 1,922,000 to 4,173,000 tons, which is considered optimistic by the OEEC. Indigenous production is estimated at 1,500,000 tons. Refining projects submitted show a total tonnage of 5,300,000 tons of crude to be processed in 1952-53, figure to 4,720,000 tons, against about but the Trizone program reduced this 800,000 tons in 1948. Present cracking capacity is 350,000 tons, excluding 240,000 tons capacity of the Wesseling hydrogenation plant, and the program foresees an eventual capacity of 2,130,000 tons, including the replacement of the hydrogenation plant which is shown to be uneconomical for the manufacture of oil products. The official program submitted by the Trizone shows a final cracking capacity of only 1,800,000 tons, based on the available topping capacity of 4,700,000 tons.

Drilling in Neutral Zone To Begin in December

FIRST drilling operations in the Saudi Arabia - Kuwait Neutral Zone off the northwest coast of the Persian Gulf will probably be started early in December.

Ralph K. Davies, president of American Independent Oil Co., said in San Francisco that the company's vessel, the Aminoil, is expected to arrive in the Persian Gulf in the near future. The ship is an LST which has been converted into a floating field camp.

American Independent and Pacific Western Oil Co. hold concession rights in the zone respectively from the sheikh of Kuwait and the Saudi Arabian king. Under an agreement reached last summer, operations are to be carried out by American Independent.

James MacPherson, vice president and general manager in charge of the Persian Gulf Operations, has left for the area, Davies said. MacPherson, formerly with Arabian American Oil Co., has been in the United States for several weeks.

Davies also said that American Independent had transferred its operational headquarters for its Mexican and Neutral Zone programs direct to the locations and that the Washington office which had previously coordinated these activities would be closed at the end of the year.

The Amanoil left Orange, Tex., September 30 carrying supplies and equipment to conduct drilling operations for a year. It was loaded by Kerr-McGee Oil Industries, Inc., and Brown Drilling Co., joint contractors for the Neutral Zone program. The territory to be drilled is a short distance south of Kuwait Oil Co., Ltd.'s Burghan field, which with about 11,000,000,000 bbl. reserves is considered the world's largest.

Fire in Russian-Controlled Austrian Field Reported

Another explosion and fire in the Russian - operated oil properties in Austria was reported last week at Neusiedl near Vienna.

Reports received in Vienna were that a compressor blew up, injuring several men and starting a fire of several hours duration.

Allied sources in Vienna last week said the Soviet Mineral Oil Administration was pushing production to a maximum in the fields which would be handed back to their owners under the expected treaty.

In New York, however, informed opinion was that any increase in Austrian production results more from development of the new area at Matzen.

American Firms Look Over Peruvian Oil Law

WASHINGTON.—A new petroleum law has been drafted for Peru and copies have been circulated among oil companies that might be interested in taking concessions, for study and suggestions before it is enacted into law, it was reported in Washington this week.

The big question, in the view of some companies, however, is whether the new code will be submitted to the Peruvian congress or made law by edict of the military junta in power. The companies, of course, would much prefer the former course as offering more assurance of continuity of the law than action by a military junta which might be reversed by the next power to take over the reins of government.

Basic features of the proposed law are understood to have been worked out with the American mission which recently surveyed Peru's economic situation and resources, headed by Dr. Julius Klein, director of the bureau of foreign and domestic commerce when former President Herbert Hoover was Secretary of Commerce.

As reported to Washington, the law would be reasonably satisfactory to United States companies interested in Peru and the Peruvian government appears to be trying to develop a procedure that would be workable. Concessions would be open to anyone who could meet the requirements set up, and cognizance is taken of the variance in conditions surrounding the search for oil in different parts of the country.

Because of these differing conditions, the country has been divided into three zones—mountain, coastal, and montana, with different rental and royalty rates and time element for each, the lowest rates and longest time for development being provided for the regions where operations would be most onerous.

Crude-Oil Production Record For 1949 Set in September

by Dahl M. Duff

A NEW record level of crude-oil production in Venezuela coupled with substantial gains in several countries in the Middle East brought total foreign output in September to its highest point thus far this year.

Foreign production excluding the United States and the Russian controlled areas reached a total of about 3,570,000 bbl. daily in September. This is approximately 96,000 bbl., or about 3 per cent, above the preceding month.

A rise in September output in the United States and revised estimates for several of the Communist controlled countries raised indicated world production for the month to 9,308,700 bbl. daily. This compares with 9,077,600 bbl. daily shown for world production in August, thus giving a percentage gain of about 2.5 per cent.

Continued demand for the heavy fuel-oil-type crudes produced in Venezuela is given credit for the increase in that country. The September total was 1,426,500 bbl. daily, compared to 1,378,000 bbl. daily in August and the low of 1,155,000 bbl. daily last March.

Another Record Seen

The previous record production in Venezuela was reached in October 1948 with 1,382,718 bbl. daily for the month. The September daily average is 43,800 bbl. daily above this. Of the September production, 993,910 bbl. daily came from the western fields, and 432,575 bbl. daily from eastern fields, giving a full total of 1,426,485 bbl. daily.

The October production in Venezuela, since reported, shows another new record. Output in that month reached 1,433,000 bbl. daily. This is about 50,300 bbl. daily above the figure for October 1948.

Venezuelan Government reports show the following production by companies in October (in barrels daily):

Creole	684,000
Shell	426,000
Mene Grande	192,000
Socony-Vacuum	37,000
Texas	27,000
Las Mercedes	16,000
Sinclair	16,000
Atlantic	14,000
Pantepec	12,000
Phillips	7,000
Richmond	1,000
British Controlled Oilfields	1,000
Total	1,433,000

In September, production of major Venezuelan fields is shown by the government's Ministerio de Fomento as follows (in barrels daily):

Western Venezuela:	
Cabimas	61,918
Lagunillas	356,991
Tia Juana	156,373
La Paz	150,118
Bachaquero	100,603
Mene Grande	48,038
El Cubo	13,109
Mara	79,751
Eastern Venezuela:	
Quiriquire	79,173
Temblador	10,300
Oficina	40,350
Jusepin	31,152
Mulata	17,355
San Joaquin	10,086
Nipa	37,596
Las Mercedes	15,969
Santa Barbara	20,696
Guico	11,191
Guara	64,622
Chimiri	26,622

The above list excludes fields shown at less than 10,000 bbl. daily in September.

Other significant though smaller production gains were reported during September in other countries of the Western Hemisphere outside the United States. Canada was at another all-time record high with 68,400 bbl. daily for the month, 5,500 bbl. daily above August.

Preliminary figures from Mexico indicated this country has brought its output above the 175,000-bbl. daily mark. Production in Colombia continued at a high level with 84,217 bbl. daily during September. This does not include 2,233 bbl. daily of condensate from De Mares. By concessions, crude-oil production was: De Mares, 32,378; Barco, 26,143; Yondo, 19,560; Cantagallo, 1,312; Dificil, 3,792; and Velasquez, 1,032.

For the entire Western Hemisphere excluding the United States, September production totaled 1,926,100 bbl. daily. This is the highest figure so far this year, and compares with a low of 1,625,900 bbl. daily in March. The September figure is 76,200 bbl. daily, or about 4 per cent above March.

TREND SINCE JANUARY 1, 1949

	W. Hemisphere less U. S.	Middle East	Foreign less Russia and E. Europe
January	1,706.4	1,358.2	3,308.6
February	1,688.6	1,400.2	3,340.2
March	1,625.9	1,393.4	3,280.2
April	1,678.2	1,485.2	3,448.3
May	1,768.5	1,417.6	3,472.8
June	1,768.8	1,375.7	3,433.3
July	1,800.2	1,338.7	3,428.1
August	1,859.9	1,323.9	3,473.1
September	1,926.1	1,351.5	3,569.2

Production in Europe and Africa showed little change from August to September. Germany reported 17,600

CRUDE-OIL PRODUCTION
(Thousands of barrels daily)

Country—	Sept.	Previous month
Western Hemisphere:		
Argentina	63.0	63.0
Bolivia	1.4	2.5
Brazil	0.3	0.3
Canada	68.4	62.9
Colombia	84.2	79.9
Cuba	0.6	0.6
Ecuador	7.5	7.5
Mexico	176.7	167.7
Peru	41.0	41.0
Trinidad	56.5	56.5
Venezuela	1,426.5	1,378.0
Total	1,926.1	1,859.9
Europe and Africa:		
France	1.3	1.0
French Morocco	0.4	0.4
Germany	17.6	17.6
Italy	0.2	0.2
Netherlands	11.9	11.9
Egypt	44.0	43.2
United Kingdom	0.9	0.9
Total	76.3	75.2
Middle East:		
Bahrein	29.8	29.7
Iran	554.1	545.4
Iraq	108.0	103.0
Kuwait	247.4	190.5
Saudi Arabia	412.2	455.3
Total	1,351.5	1,323.9
Far East:		
British Borneo	72.0	70.0
Burma	0.6	0.6
China	1.5	1.5
India	5.3	5.3
Indonesia (less New Guinea)	125.0	125.0
Japan	3.9	3.9
New Guinea	4.8	5.6
Pakistan	2.2	2.2
Total	215.3	214.1
Total, foreign less Russia & E. Europe	3,569.2	3,473.1
Russia & E. Europe:		
Albania	1.0	1.0
Austria	18.2	18.2
Czechoslovakia	0.9	0.9
Hungary	10.5	10.5
Poland	2.7	2.7
Romania	90.0	90.0
Russia	700.0	700.0
Yugoslavia	1.2	1.2
Total	824.5	824.5
Total, foreign	4,393.7	4,297.6
Total United States	4,915.0	4,780.0
Total world	9,308.7	9,077.6

The monthly production figures are accurate for all countries in the Middle East and the more important producing countries in the Western Hemisphere and Europe. In some other cases, estimates have been made based on the performance of preceding months. Figures in the column, "Previous month," do not agree in some instances with those heretofore published for August since revisions have been made due to later information. Data for Colombia and Canada excludes condensate. No up-to-date figures are available for Russia and the Russian dominated countries of Eastern Europe, and here the information is in general the latest obtainable, reflecting what is believed to be the level of current production. Most other figures in the tabulation are from official government or company reports.

bbl. daily, the same as August's total which was a postwar record.

In the Middle East, several countries showed increases in September over August. However, in this area, the sharply rising trend which began after the war leveled off earlier this year, and in general, present production represent fluctuations around a somewhat steady program.

Kuwait fell sharply in August to approximately 190,000 bbl. daily, but the September figure showed its production back up to the previous level of about 250,000 bbl. daily. Saudi Arabian production in September dropped to 412,200 bbl. daily, but the October figure, since released, shows output in this country back up to 486,900 bbl. daily.

Arabian American Oil Co.'s report for October shows production the first 10 months of the year amounted to 146,040,061 bbl. daily, an average of 480,395 bbl. daily. Crude processed in the Ras Tanura refinery averaged 100,098 bbl. daily in October and 130,152 bbl. daily for the first 10 months of the year.

Lack of reliable, up-to-date information on the Far East precludes an exact report on production in this area. The 125,000 bbl. daily reported for Indonesia less New Guinea is estimated on the basis of official reports available up to midyear. Shell's successful work in British Borneo have raised production in this area far above prewar.

Recent information from unofficial sources has led to a revision of production estimates for several of the so-called Iron Curtain countries. Partly from the indefinite percentage figures issued by the Soviet Government, Russian production is now placed at about 700,000 bbl. daily. The new production obtained by the Soviet Mineral Oil Administration at Matzen in Austria has offset declines which are taking place in some older fields. Output for this year in Austria is believed to be at a level of about 1,000,000 tons a year, or about 18,200 bbl. daily. The estimate for Romania also has been revised upward with reports indicating the Communist group in this country has forced a higher production in order to justify its program.

Brazil's NPC Approves 30-Mile Products Line

The Brazilian National Petroleum Council has approved the project and budget for the construction of the 30-mile pipe line which will move products inland from the seacoast to the Sao Paulo industrial area.

Engineering and other planning for the line has been in progress in New York since early this year with the assistance of William Heltzel, pipeline consultant.

All work in the fiscalization of the project has not been completed, and actual construction is not expected to get under way until after the middle of the year. Contract has not been let, though it is expected fixed-fee bids will be invited from a selected group of contractors.

The line will be the first petroleum pipe line in the country. Actual construction and operation will be under Estrada de Perro Santos a Jundiai, the government-owned railroad. The line will originate near Santos.

Lakhra Wildcat May Go As Deep as 16,000 Ft.

Burmah Oil Co. (Pakistan Concessions) Ltd., has resumed drilling in its Lakhra wildcat in southern Pakistan and preparing to carry the well considerably deeper, perhaps 16,000 ft.

The well, at 10,935 ft. at latest report, was shut down on reaching 10,799 ft. in order to overhaul equipment and change mud. Sandstone encountered at 10,770 ft. changed to shale at 10,858 ft. The sand was dry.

The Lakhra well, begun May 14, 1948, already holds the depth record for the Indian Subcontinent.

Imperial Sells Control of Two Alberta Companies

Imperial Oil, Ltd., has sold its entire controlling interest in two Turney Valley (Alberta) companies to Federated Petroleum. Ltd.

One of the companies was Foothills Oil & Gas. Ltd., in which Imperial held 1,181,805 shares or 80.8 per cent of the total outstanding. Foothills holds a 62.7 per cent interest in Southwest Petroleums. Foothills produces in Northern Turner Valley, about 1,000 bbl. daily from some 19 wells during 1948.

The second company was Lowery Petroleum. Ltd., in which Imperial held 770,000 shares or 77 per cent interest.

Market value of the shares purchased by Federated Petroleums was reported to be approximately $4,000,000. Imperial officials said it was apparent there would be increasing difficulty maintaining competitive conditions if the subsidiaries were retained and that furthermore the assets were needed for other company expansion.

Jersey Standard Forms New Shipping Subsidiary

Standard Oil Co. (N. J.) has organized a new domestic subsidiary, Esso Shipping Co., which will take over the company's ocean tanker fleet January 1.

Incorporated in Delaware, Esso Shipping is being used to centralize

all marine operations that have been carried on by Jersey Standard since 1944. A company announcement said all activities of the company's marine department and shore and seagoing personnel will be shifted to the shipping company.

Esso Shipping will own and operate 54 ocean-going tankers, all under United States registry with a deadweight tonnage of 897,492 tons. This is the largest fleet of private owned ships under the American flag.

The new officers of Esso Shipping have been selected from the present management of the Jersey company's marine department. They are Millard G. Gamble, president; John J. Winterbottom, executive vice president; John D. Rogers, vice president; Clinton DeWitt, treasurer-comptroller; and Edmund A. Flotten, secretary. Gamble will continue to act as coordinator of all marine transport, including 61 additional ocean-going tankers totaling 1,030,173 deadweight tons, as well as 83 special service tankers totaling 258,556 deadweight tons, owned by foreign affiliates.

Executive offices of the new company will be at 30 Rockfeller Plaza with downtown offices at 115 Broadway in New York City.

Deep Test in Burghan Field Below 5,000 Ft.

The deep test of Kuwait Oil Co., Ltd., in Burghan field designed to explore possible limestone production has reached a depth of slightly more than 5,000 ft.

The well, designated as DT 1, penetrated the usual sandstone producing horizons and ran into a fishing job at 5,002 ft. The heavy rig will go to 10,000 or 12,000 ft., if necessary, to investigate the deeper formations.

The operation is being followed with considerable interest. Unlike other large limestone fields in the Middle East, Burghan produces from a series of sandstones, and the limestone may also be present and productive at greater depth.

Kuwait Oil Co. recently completed a 25,000-bbl. daily topping plant which will be operated to meet local demand for light products and also bunkering fuels for ships. Before the end of the year, the company is expected to complete its new loading pier. This pier, believed to be the largest of its kind yet constructed, will be nearly a mile long and will carry a roadway 24 ft. wide and a pipe way 35 ft. wide upon which will run eight 24-in. crude oil and servicing lines.

Current Work to Give Tanker Fleet Big Boost

WASHINGTON. — Completion of present construction programs will bring the world tanker fleet to a total of about 29,000,000 deadweight tons, an increase of 72 per cent over 1939, according to a survey of the merchant fleets of the world by the National Federation of American Shipping.

When all ocean-going vessels of 1,000 gross tons and over now under construction are completed, the world fleet will total over 89,000,000 tons, of which tankers will account for nearly one-third, the Federation said. It will be nearly 13 per cent larger than a decade ago as a whole, but the tonnage in vessels other than tankers will be 3 per cent less.

Out of the 29,000,000 tons of tanker capacity, the United States will have 7,251,000 tons, according to the Federation's figures. This will be about 71 per cent more than the 4,258,000 tons held 10 years ago, but this country's proportion of the world tanker fleet will be only 24.9 per cent as against 25.2 per cent.

The British and Norwegian tanker fleets, which follow that of the United States in that order, will be materially increased by present construction programs. The British fleet, which totaled 4,300,000 tons in 1939 and is currently 5,400,000 tons, will grow to 6,700,000 tons, only a half-million tons behind the United States, and the Norwegian fleet, which was 3,100,000 tons in 1939 and currently is about the same, will increase to 5,200,000 tons.

About 1,200,000 tons of new vessels are now under construction or on order in United States shipyards out of a total of 10,700,000 tons throughout the world. Construction here includes about 1,000,000 tons of tankers, practically all of it for "export" to other countries under whose flags they will operate, the Federation said.

Oil Tops Other Industries In Executive-Training Plan

Thirty-five oil-company executives engaged in both foreign and domestic operations are scheduled December 9 to complete the current advanced management program of the Graduate School of Business Administration of Harvard University in Boston.

The group representing 24 different companies are the latest of the numerous industry officials who have been sent to the school by their companies. The work is designed for the development and broadening of managment personnel, and indicative of the recognition in the petroleum industry of the value of such a program is the fact that the oil business has the largest group in attendance, 35 out of 127 in the current sixteenth session.

Officials from the petroleum industry now taking the course are:

Neale Boyd, secretary and assistant treasurer, and Neal B. Prichard, assistant manager of refineries, Anderson-Prichard Oil Corp.; Orville L. Fisher, assistant manager, production department, Continental Oil Co.; Charles M. Richardson, assistant manager, materials department, and Louis W. Storms, Jr., chief petroleum engineer, Creole Petroleum Corp.; Erik Frandsen, vice chairman, director, Det Danske Petroleums Aktieselskab; James P. Warner, manager, chemical products division, Esso Standard Oil Co.; Edward S. Bleecker, assistant to the vice president, foreign exploration, Gulf Oil Corp.; Homer G. Patrick, chief of seismic section, and H. Dayton Wilde, manager, research and development, Humble Oil & Refining Co.; Albert W. Pecore, chief engineer, Humble Pipe Line Co.; Alan C. Harrop, general superintendent, Imperial Oil, Ltd.

James M. Whiteley, Jr., technical superintendent, Lago Oil & Transport Co., Ltd.; William W. Flenniken, vice president and general manager, drilling, Fred M. Manning, Inc.; Grady I. Davis, division manager, Mene Grande Oil Co., C.A.; Fred F. Steingraber, manager of terminals division, Pure Oil Co.; John H. Hall, assistant to vice president, marketing operations, Elbert A. Hugill, executive assistant to the vice president, and Paul L. Kartzke, Rocky Mountain division manager, Shell Oil Co.; Morris T. Carpenter, executive director, Whiting laboratories, Alfred H. Hayes, assistant general superintendent, Whiting refinery, and William A. Underwood, assistant comptroller, Standard Oil Co. (Indiana); Frank H. Willibrand, manager of production, Sohio Petroleum Co.

William F. Schumacher, associate director of process division, Esso laboratories, Standard Oil Development Co.; Martin E. Jones, executive assistant attorney-negotiator, production department, and Alfred O. Savage, assistant comptroller, Standard Oil Co. (N. J.); Ralph A. Martin, controller, and Frederick J. Sanders, technical manager, Standard Oil Co. (Ohio); W. Walker Geddes, managing director, Standard-Vacuum Sales Co.; Harry A. Gibbon, general manager, Standard-Vacuum Petroleum Mij.; Whitney M. Elias, chief engineer, and Foster J. Schempf, division manager, Stanolind Oil & Gas Co.; Robert J. Andress, director in charge of traffic, Stanolind Pipe Line Co.; Walter H. Spears, vice president, Union Producing Co.; and R. Paul Huggins, vice president, Western Gulf Oil Co.

Earthquake Does $2,000,000 Damage to California Wells

A sharp earthquake of 12 seconds duration in the Long Beach, Calif., area did approximately $2,000,000 worth of damage to oil wells November 18. The quake put between 35 and 50 producing wells on Terminal Island out of operation, according to Robert R. Shoemaker, chief engineer for the Port of Long Beach.

Shoemaker's $2,000,000 damage estimate includes a production loss of 6,000 bbl. per day and cost of repairing wrecked casings and sheared-off pumping equipment.

West Texas Oil Interests Are Sold for $1,750,000

The interest of J. C. Bertrand, Pinehurst, N. C., in Bertrand & Bradford, Inc., Sweetwater, Tex., oil firm, has been purchased by Andrew A. Bradford, Sweetwater, for a cash consideration reported in excess of $1,750,000.

The sale involved 43 producing wells and acreage in West Texas and New Mexico. The firm will continue operation under its present name but headquarters will be moved from Sweetwater to Midland, Tex.

Bradford was in partnership with French Robertson, Abilene, Tex., prior to forming the partnership with Bertrand in 1941.

28,000-Ton Tanker for Gulf Oil Corp. Launched

Another supertanker, the San Tome, of 8,000 deadweight tons, was launched last week at the Bethlehem Steel Co.'s Sparrows Point (Md.) shipyard.

The vessel will be chartered by Gulf Oil Corp. It was built by Afran Transport Co. and will be completed next month. It has a speed of 16 knots and can discharge its bulk cargo of 40,000 bbl. in about 12 hours.

Houston Independents Start Alberta Seismograph Work

Five Houston independent oil groups have begun seismograph work on a 202,677-acre spread of Canadian Pacific Railway oil rights in the Wintering Hill area, approximately 55 miles due east of Calgary on the southern Alberta plains. The program is being carried out under an exploration agreement reached last July with a group of Canadian independents from Calgary.

The Texas group, on their initial Alberta venture, include George and Herman Brown, Brown Shipbuilding Corp.; Heep Oil Corp., Conroe Drilling Co., P. R. Rutherford, and V. A. Brill.

They are exploring the block under an agreement with Calgary holders of the railroad's permit, including Atlantic Oil Co., Ltd., with 50 per cent interest; Pacific Petroleums, Ltd., 12½ per cent; Princess Petroleums, Ltd., 12½ per cent, and others, 25 per cent interest.

OIT Clamps Ban on Export of "Know-How"

WASHINGTON.—The Office of International Trade moved further last week to keep vital United States products and "know-how" from reaching potential enemies.

Following up on the tightening of export controls which has added several hundred products to the positive list of commodities which may be shipped to any country other than Canada only under individual license, the OIT imposed a voluntary ban on the export of unclassified technical data of "an advanced nature significant to the national security."

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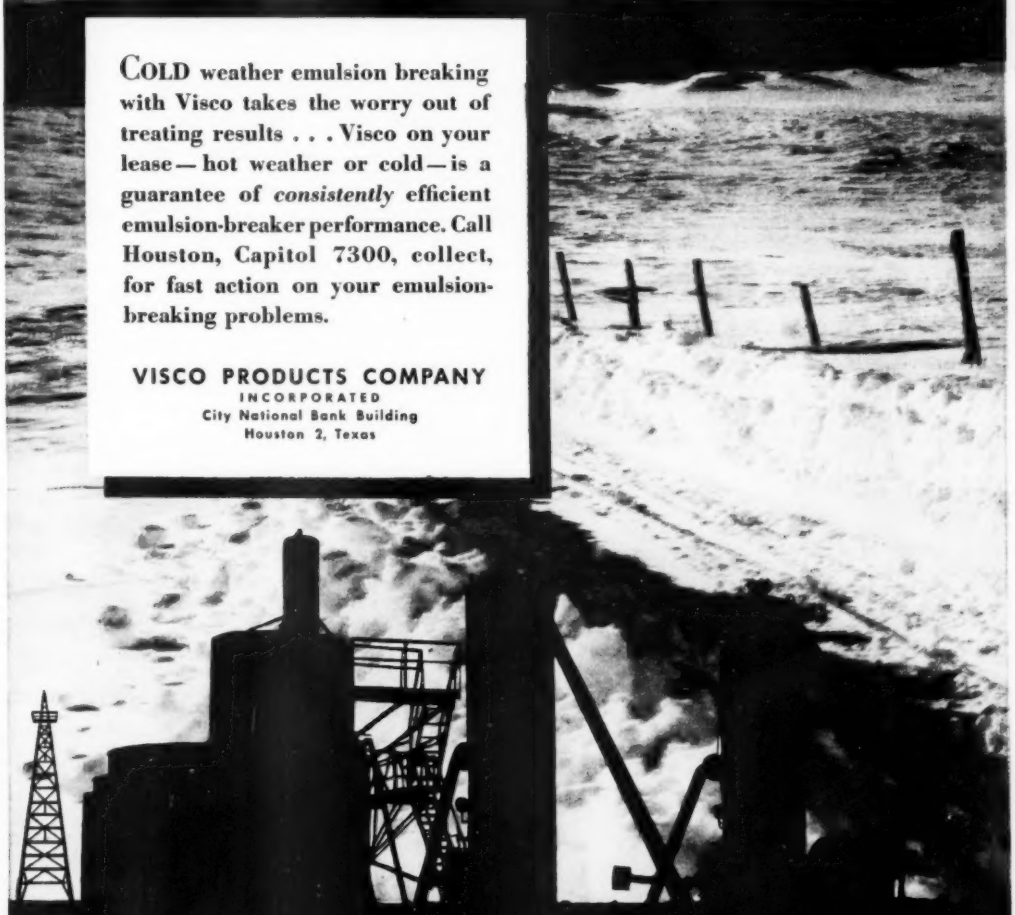

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PERSONALS

True Is a Veteran With Magnolia Pipe Line Co.

LESLIE H. TRUE, vice president and manager of pipe lines for Magnolia Pipe Line Co., Dallas, will observe his twenty-seventh anniversary with the company next month. A veteran pipeliner, he joined the company in December 1922 as a time keeper in Arkansas.

Soon after he joined the firm he was assigned as a pipeliner on an Oklahoma construction job. Later he was named gager at Corsicana, Tex., and was then transferred to Burkburnett, Archer, Crane, and Wink, Tex. He was later named chief gager in East Texas, and in 1931 became pipe-line scout.

In July 1934 True was named district superintendent of the Luling pipe-line district, and in 1937 was made general superintendent for Texas, Louisiana, and Arkansas. A year later he was advanced to assistant manager of pipe lines and in March 1945 was elected to the board of directors. In October the same year he was elected vice president of the firm and in 1946 was appointed manager of pipe lines.

It was under his supervision that the company's 650-mile, 20-in. crude-oil line was constructed in 1947-48 from Corsicana, Tex., to Patoka, Ill.

True is a director of Texas Utility Co. and a member of Dallas Petroleum Engineers Club.

Howell R. Adair has been named purchasing agent for the Southwest production division, Sun Oil Co., succeeding **Ira C. Jared,** who requested to be relieved of primary duties Jared will remain with the company to serve in an advisory capacity to the purchasing department. Adair formerly served as Jared's assistant, and joined the company in 1933.

Upshur Evans has been appointed to the newly created post of assistant to the chairman of the board of directors, Standard Oil Co. (Ohio). He formerly was national accountant representative for Gulf Oil Corp.

G. H. McKay has opened offices in Houston as a consulting engineer. He formerly was with Tennessee Gas Transmission Co., East Tennessee Natural Gas Co., and Arkansas Louisiana Gas Co.

W. F. Youngblood, tool pusher for Penrod Drilling Co. at Jonesville, La., is serving in a similar capacity at Snyder, Tex.

Marshall R. Pullen, formerly engineer for Hunt Oil Co. at Shreveport, has been transferred to Marksville, La., as superintendent of production

C. B. Smith, Jr., seismograph party chief for Continental Oil Co. at Pecos, Tex., has been transferred in a similar capacity to Hamlin, Tex.

Elmer Slothower, formerly farm foreman for Ohio Oil Co. at McFadden, Wyo., has been moved to Casper as transportation superintendent.

Albert E. Kirkland, Tulsa, independent oil operator, has retired from active service as a producer and drilling contractor and moved to Albuquerque, N. M.

O. L. Williams, chief station engineer for Pan American Pipe Line Co. at Livingston, Tex., has been transferred to the Quitman, Tex., district in the same capacity.

William R. Darling, veteran district superintendent for Tide Water Associated Oil Co. at Seminole, Okla., has retired after 28 years of service, and has moved to Malvern, Ark.

R. L. Kirkwood, drilling contractor, Alice, Tex., has opened a new branch production office in San Antonio.

H. T. Olsen, Superior Oil Co. of California, Los Angeles, is now in Oklahoma City and will serve as district manager for the company during the absence of **Edwin L. Smith,** who is now on a foreign assignment. Olsen will direct operations in Oklahoma, Kansas, Nebraska, West Texas, and New Mexico.

B. C. Wright, field-production superintendent, New Orleans district, United Gas Pipe Line Co., has been transferred to the Southwest Louisiana district as district pipe-line superintendent. Other changes include: **W. R. McQueen,** foreman, Shreveport district, transferred to the New Orleans district as field-production superintendent; **A. P. Batchelor,** assistant engineer, Shreveport, transferred to the Jackson district as assistant engineer; **J. M. Wright,** chief engineer at Conroe compressor station, Houston district, transferred to the Southwest Louisiana district as chief engineer of Iowa compressor station; **J. G. Broussard,** engineer, Southwest Louisiana district, transferred to Shreveport compressor-station department as electrician; **Frank Roberts,** foreman, Southwest Louisiana district, transferred to the Shreveport district as foreman; **Leo Wright,** foreman, San Antonio district, transferred to the Dallas district in the same capacity; **S. R. Wiley,** scout, Beeville and Wichita Falls districts, transferred to Shreveport in the same capacity; **Robert D. Warren,** assistant foreman, Houston division, named utility foreman; **James H. Brooksh, Jr.,** engineer at New Iberia, named district engineer at Lake Charles; and **John H. Huffman,** district engineer, Lake Charles district, transferred to Monroe, La., as division engineer.

FERRIS DANGBERG

Ferris Dangberg, Hancock Oil Co. of California, has been elected chairman of the Southern California Chapter, American Petroleum Institute. Other officers include: **C. C. Gandaubert,** General Petroleum Corp., vice chairman; **William Anderson,** Oil Tool Corp., secretary-treasurer; and **Don Hall,** McCullough Tool Co., assistant secretary-treasurer. The A.P.I. chapter is now the largest on the West Coast, with membership exceeding 800.

Jack H. Liem, engineer for Grey Wolf Drilling Co. at Mission, Tex., has been transferred in a similar capacity to Houston.

Robert B. Austin, member of the New Orleans development - geology staff, California Co., has been transferred as geologist to Denver, where he will serve on the geological staff covering activities in Colorado, Utah, and Arizona.

John A. Sutherland, formerly process-design engineer in the construction section, manufacturing department, Stanolind Oil & Gas Co., Tulsa, has been transferred to the company's Salt Creek gasoline plant, Midwest, Wyo., where he is acting as chemist.

V. J. Mercier, Wichita, has been elected section delegate in the newly created Council of Section Delegates, American Institute of Mining and Metallurgical Engineers. He has served the Kansas Section, A.I.M.E., as chairman since October 1948, and will complete his term December 31. He is with Mountain Iron & Supply Co.

Robert D. Mebane, geologist in charge of Southwest and West Texas for Saltmount Oil Co., has resigned his position and will open consulting offices in San Antonio.

C. T. Riley, tool pusher for Rio Bravo Oil Co., Ltd., and formerly stationed at Farson, Wyo., is now serving in that capacity in the Stettler, Alta., Canada, area.

Harold Underwood, chief operator for Texas Eastern Transmission Corp. at Mount Sterling, Ohio, has been transferred to Norris City, Ill., in the same capacity.

L. H. Morris, formerly superintendent of pipe-line construction for Lehman-Hoge & Scott, at Austin, is now manager of the pipe-line division, headquartered in Harlingen, Tex.

William W. Rubey, staff-research geologist for U. S. Geological Survey, has been elected president of Geological Society of America. He joined U.S.G.S. following a period as instructor in the geology department at Yale University.

Stanley Smith has joined the geological staff of Skelly Oil Co., with headquarters in Midland, Tex. He formerly served as geologist in Skelly's Albuquerque office.

Frank Jewell, formerly assistant district production superintendent for Humble Oil & Refining Co. at Avoca, Tex., has been named superintendent of the newly formed Winters, Tex., district. Others appointed to the new production district include: **W. G. Werner,** formerly in the division office at Wichita Falls, Tex., named chief clerk; **R. A. Brand,** Vernon, Tex., named assistant district chief clerk; **W. E. King,** district clerk from Pampa, transferred to Winters in the same capacity; **F. G. Thomas,** district petroleum engineer at Pampa, transferred to Winters in that capacity; **William Thiebaud,** tool pusher at Hobbs, N. M., West Texas division, moved to Winters; and **D. K. Smith,** farm boss, transferred to Winters from Means, in the West Texas division.

Ben R. Thomason, formerly a member of the geological staff of The Texas Co., Midland, has joined American Republics Corp. in San Antonio as geologist. He succeeds **H. D. Pennel,** who resigned to accept a position in the district office of Kewanee Oil Co. in Midland.

M. M. Merritt, independent operator, has moved from San Diego, Calif., where he was engaged in geophysical work, to Midland, Tex., where he will operate in the Permian basin.

Wylie O. Summers, McCarthy Oil & Gas Corp., has been elected president of Houston Landmen's Association for 1950. Other officers elected include: **A. D. Hunter,** Humble Oil & Refining Co., vice president; **G. E. Faust,** Magnolia-Abercrombie Oil Co., secretary; **B. G. Krahn,** with Claud Hamill, independent oil operator, treasurer. Directors elected include: **Hal Erwin,** Atlantic Refining Co.; **C. C. Steinberger, Jr.,** Mid-States Oil Corp.; **F. J. Miller,** Arkansas Fuel Co.; **E. Z. Hannon,** Sinclair Oil & Gas Co.; and **R. E. Wheless,** J. S. Abercrombie Co.

Charles B. Rayner, eastern representative for American Independent Oil Co. for the past 2 years, has resigned. Previous to joining the company he was a petroleum consultant to the U. S. State Department.

Orlo E. Childs, Phillips Petroleum Co., has been elected president of Intermountain Association of Petroleum Geologists, Salt Lake City. Other officers include: **Robert J. Minton,** Phillips Petroleum Co., vice president; **George Farmer,** U. S. Smelting & Refining Co., secretary; **Louis F. Wells,** Sun Oil Co., treasurer; and **Frank Neighbors,** Sun Oil Co., chairman of the executive committee.

Floyd A. Calvert, on the legal staff of Pure Oil Co.'s Michigan producing division, Saginaw, since 1932, will be transferred to Washington, D. C., by the company in January, where he will serve in an executive capacity.

Donald H. McLaughlin, president of Homestake Mining Co. and well-known San Francisco geologist, has been elected president of American Institute of Mining and Metallurgical Engineers for 1950. **Harold Decker,** assistant manager of Pan American Production Co., and Pan American Gas Co., Houston; and **Gail F. Moulton,** geologist, Chase National Bank, New York City, were added to the

Officials of the Central Oklahoma Chapter, American Petroleum Institute, are shown at a recent meeting in Oklahoma City, during which plans for enlarging membership of the chapter were outlined. Front row, left to right: T. E. Ockershauser, Globe Oil & Refining Co.; John H. Murrell, Dallas, manager, DeGolyer & MacNaughton, principal speaker; J. H. Field, Sohio Petroleum Co., chairman of the advisory committee. Back row: W. W. Heavner, Continental Supply Co., vice chairman for membership; G. E. Saunders, Sohio, secretary-treasurer; J. A. Kornfeld, Sohio, vice chairman for programs; and W. M. Edinger, Production Engineering Laboratories, chairman. Present membership exceeds 650

PERSONALS

board of directors. **John E. Sherborne,** Union Oil Co. of California, was elected chairman of the petroleum division.

SHIFTS—

Fred R. Williams, engineer, Phillips Petroleum Co., Borger, Tex., to Holdrege, Neb.; **E. J. Wacker, Jr.,** engineer, Magnolia Pipe Line Co., Dallas to Midland, Tex.; **J. J. Cowden,** geologist, Continental Oil Co., Hebbronville, Tex., to Davis, Okla.; **J. D. Clark,** engineer, Stanolind Oil & Gas Co., High Island, Tex., to Houston; **Herbert Henderson, Jr.,** refinery engineer, Stanolind Oil & Gas Co., Levelland, Tex., to Los Angeles; **H. O. Hathaway,** superintendent, Amerada Petroleum Corp., Midland, Tex., to Fort Worth; **R. C. Cashin,** engineer, Phillips Petroleum Co., Nocona, Tex., to Port Gibson, Miss.; **Pete Defrank,** engineer, Humble Oil & Refining Co., Tyler to Nacogdoches, Tex.

Jack H. Ray, engineer, Magnolia Petroleum Co., Vernon, Tex., to Lake Charles, La.; **Robert B. Austin,** geologist, California Co., New Orleans to Denver; **G. E. McClatchey,** engineer, Barnsdall Oil Co., New Orleans to Gulfport, Miss.; **Marshall R. Pullen,** engineer, Hunt Oil Co., Shreveport to Marksville, La.; **E. V. Hunt,** superintendent, Fish Constructors, Inc., Selma, Ala., to Newnan, Ga.; **Leo Ford,** superintendent, Gulf States Asphalt Co., Dearborn, Mich., to Houston; **Gus Howell,** superintendent, Penrod Drilling Co., Lucedale, Miss., to Colorado City, Tex.; **Christopher E. Loeser,** engineer, Standard Oil Development Co., Montclair to Roselle Park, N. J.

Harold Underwood, Texas Eastern Transportation Co., Williamsport, Ohio, to Morris City, Ill.; **Carl W. Blakey,** superintendent, Seismograph Service Corp., Denver to Tulsa; **H. C. Jones,** superintendent, Stanolind Pipe Line Co., Hominy to Shawnee, Okla.; **William L. Robbins,** engineer, Pauls Valley, Okla., to Tulsa; **F. E. Mertz,** engineer, Phillips Petroleum Co., Stillwater to Ponca City, Okla.; **Floyd L. Stewart,** engineer, Standard Oil Co. of California, Maracaibo, Venezuela, S. A., to Ventura, Calif.; **F. L. Hoipkemeier,** engineer, Stanolind Oil & Gas Co., Pauls Valley, Okla., to Wink, Tex.

Earl C. Cockrum, geologist, Carter Oil Co., Purcell, Okla., to Mattoon, Ill.; **Glenn F. Park,** engineer, Socony-Vacuum Oil Co., Inc., Wewoka, Okla., to Falfurrias, Tex.; **Bruce Echo Hawk,** Century Geophysical Corp., Tulsa, to Oakley, Kans.; **H. Yellin,** engineer, Interprovincial Pipe Line Co., Tulsa, to Edmonton, Alta., Canada; **William S. Rector,** engineer, Maracaibo, Venezuela, S. A., to Long Beach, Calif.

DEATHS

Edward G. Seubert, 73, president of Standard Oil Co. (Ind.) from 1927 to 1944, died November 17 in Chicago. A native of Syracuse, N. Y., Seubert joined Standard of Indiana at the age of 15 in 1891, 2 years after the company was incorporated. He served in a number of capacities, including those of chief clerk and auditor of the manufacturing department, assistant secretary-treasurer, secretary, treasurer, director, and vice president. He retired from active company service on his seventieth birthday, June 20, 1946, after a career of nearly 54 years with the company. From January 1945 until retirement he was chairman of the company's executive committee. He served as a director from 1919 until retirement, and, as president from 1927 to 1945 and chief executive from 1929 to 1945, he served longer than any predecessor in either capacity.

A. D. Jack, 72, veteran of 30 years with The Texas Co.'s refining department before his retirement, died in Tulsa November 20.

Charles Hoyt Ellingwood, 82, who retired 4 years ago as chairman of the board of Wolf's Head Oil Refining Co., Inc., died November 14 in Montclair, N. J. Ellingwood founded Wolverine Lubricant Co. in 1911 and remained president when it became Wolverine Empire Refining Co. in 1929. He became chairman of Wolf's Head in 1938 when it succeeded the earlier refining company.

Charles A. Repkie, 53, still operator at the Bayway, N. J., refinery of Esso Standard Oil Co., died November 16 in Rahway, N. J.

Herman B. Hogg, retired vice president of National Supply Co., died recently in Parkersburg, W. Va.

Bert H. Lewis, 61, Tulsa, employe of the light-oil department at Mid-Continent Petroleum Corp.'s West Tulsa refinery for 25 years, died November 16.

John A. Wright, 92, retired boilermaker, who took part in some of the earliest oil booms in the United States, died November 13, in Houston.

T. A. Northrup, 64, president of Northrup Equipment Co., Parkersburg, W. Va., died October 25.

Thomas Laffey, 78, retired employe of Tide Water Associated Oil Co., at Bayonne, N. J., died November 14.

B. E. Cranfill, 60, Dallas and Wichita Falls, Tex., independent oil operator, died in Dallas November 19.

Elmer M. Cooper, Chanute, Kans., vice president of Chanute Refining Co. and formerly operator of Guaranty Oil Co., died in Kansas City, Mo., November 20.

Francis H. Crawford, 82, former vice president and general manager of Ohio Fuel Gas Co., died in Columbus, Ohio, November 19. He retired in 1930.

L. B. Linscomb, 60, Vidor, Tex., for 33 years an employe of The Texas Co.'s refinery at Port Arthur, died November 19.

James Doak, 66, Bristow, Okla., drilling contractor and partner in Doak & Hughes Co., died November 20. He was one of the developers of the Drumright, Okla., oil field.

Ralph B. Kerr, 64, well puller for Long Beach Oil Development Co., died November 12.

James C. McIntyre, 64, retired oil operator of Hufsmith, Tex., died November 15.

Moffett M. Miller, 65, retired assistant auditor for the pipe-line and production division of the Gulf Oil Corp., Houston, died November 12.

C. A. Mulligan, 56, a veteran of 30 years in pipe-line construction and one of the Humble Pipe Line Co.'s first employes, died November 16, in Houston.

C. F. Nichols, 59, independent oil operator, died in Beeville, Tex., November 15.

John Albert Smith, 48, former oil driller in the West Texas area, died in Pampa November 15.

The OIL and GAS JOURNAL'S

Special Section on

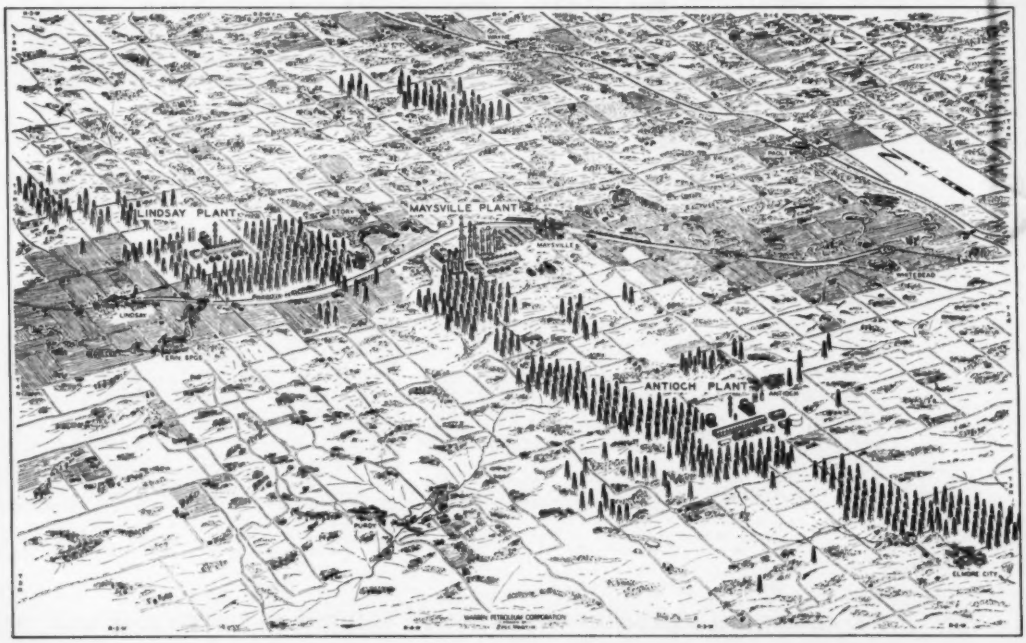
GARVIN COUNTY PLANTS

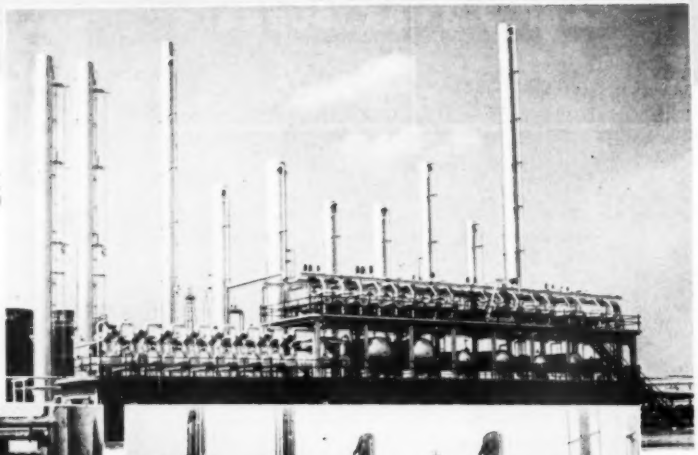
Installed by

CARTER, CITIES SERVICE, CROSBIE, TEXAS CO. and WARREN PETROLEUM

This special editorial section of The Oil and Gas Journal presents six articles covering various phases of the "Garvin County Plants." Location is in the center of eight of Oklahoma's newest oil fields, in the southern part of the state. Functions of the plants are: (1) The oil-field gas production is gathered from the eight fields and the liquid hydrocarbon content extracted; (2) the stripped gas is dehydrated; (3) a part is further compressed for injection back to one of the producing reservoirs; (4) the rest of the stripped and dehydrated gas is sold to gas pipe lines.

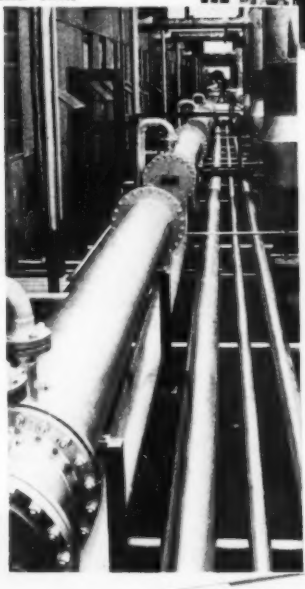
The Garvin County Plants as a whole represent one of the newest and largest gas-processing operations to be found in the oil fields. The plants are representative of the growth of gas-processing and gas-conservation facilities, as installed or under construction in many producing areas of the United States.

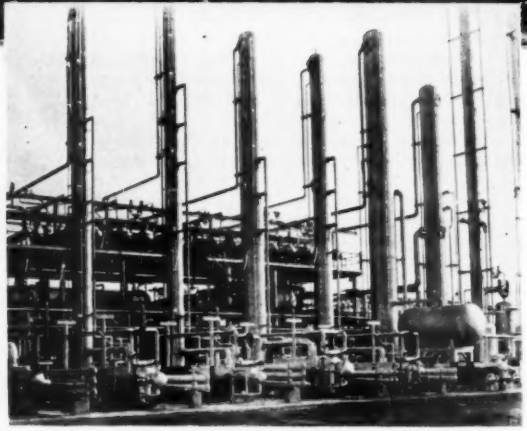




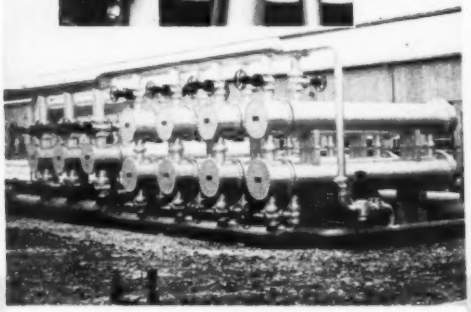
Batteries of G-R Main Still, Primary Still, Deethanizer, Debutanizer, Depentanizer, and Splitter Condensers.

G-R Jacket Water Coolers for Power Cylinders and Compresser Cylinders of Diesel Engine-driven Compressor Units.

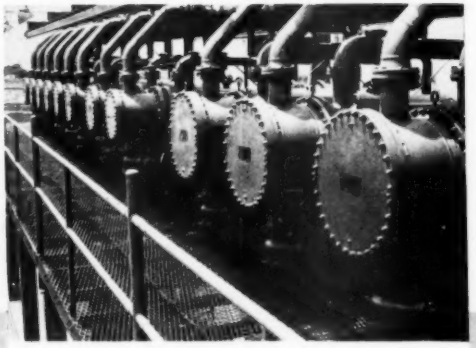




Group of G-R U-Tube Reboilers, and stacks of G-R Twin G-Fin Sections serving as Feed Exchangers and Product Coolers.



Some of the G-R Lube Oil Coolers for the Compressor Units.



Close-up View of the stationary head ends of some of the G-R Condensers shown in illustration at upper right.

GRISCOM-RUSSELL: PIONEERS IN HEAT TRANSFER APPARATUS

NINETY FIVE

G-R UNITS

ON 37 DIFFERENT

HEAT TRANSFER SERVICES

at Stanolind's New Hastings Plant

The Hastings gasoline recovery plant of Stanolind Oil & Gas Company at Alvin, Texas, is one of the many important modern projects in the petroleum industry for which maximum effectiveness and economy of heat transfer are assured by G-R equipment.

The great variety of G-R equipment at this plant, as listed in the column at the right, is significant to you. It means that G-R can furnish exactly the correct type of unit for *any* and *every* heat transfer service. No matter what may be *your* needs for heaters, coolers, condensers or heat exchangers . . . in standard or special designs . . . for moderate or severe requirements . . . you can safely depend on the unequalled G-R engineering experience and performance records. Write for bulletins describing G-R equipment for services in which you are interested.

THE GRISCOM-RUSSELL CO.

285 MADISON AVENUE, NEW YORK 17, N. Y.

GRISCOM-RUSSELL

ROSTER OF G-R APPARATUS AT HASTINGS

2—FST Splitter Condensers

2—Twin G-Fin Section Splitter Feed Exchangers

1—CSU Splitter Reboiler

2—FGT Deethanizer Condensers

2—Twin G-Fin Section Deethanizer Feed Exchangers

1—CSU Deethanizer Reboiler

2—FST Depropanizer Condensers

3—Twin G-Fin Section Depropanizer Feed Exchangers

1—CSU Depropanizer Reboiler

2—FGT Debutanizer Condensers

2—Twin G-Fin Section Debutanizer Feed Exchangers

1—CSU Debutanizer Reboiler

2—FST Depentanizer Condensers

2—Twin G-Fin Section Depentanizer Feed Exchangers

1—CSU Depentanizer Reboiler

3—FGT Primary Still Condensers

3—FGT Main Still Condensers

2—Twin G-Fin Section Propane Coolers

1—Twin G-Fin Section Propane Dehydration Regeneration Gas Reheater

1—Twin G-Fin Section Mixed Butane Cooler

3—Twin G-Fin Section Debutanizer Bottoms Coolers

2—Twin G-Fin Section Isopentane Final Coolers

3—Twin G-Fin Section Gasoline Coolers

4—FST Rich Oil Preheaters

3—Twin Bare Pipe Section Regeneration Gas Coolers

2—Twin Bare Pipe Section Regeneration Gas Heaters

2—Twin Bare Pipe Section Reabsorber Intercoolers

8—FST Main Oil Exchangers

12—FST Compressor Lube Oil Coolers

8—FST Compressor Jacket Water Exchangers

3—FST Engine Jacket Water Coolers

1—H Bentube Feedwater Evaporator

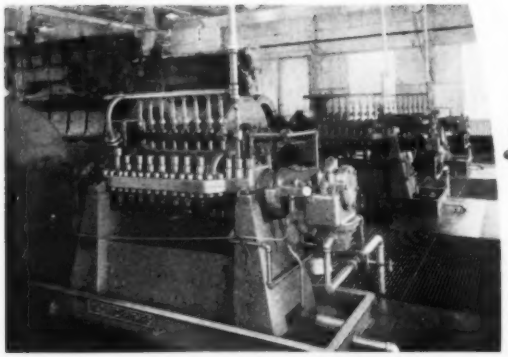
1—F Drainer

1—K Level Controller

3—Twin Bare Pipe Section Steam Condensate Exchangers

2—Twin Bare Pipe Section Condensate Coolers

GR-259

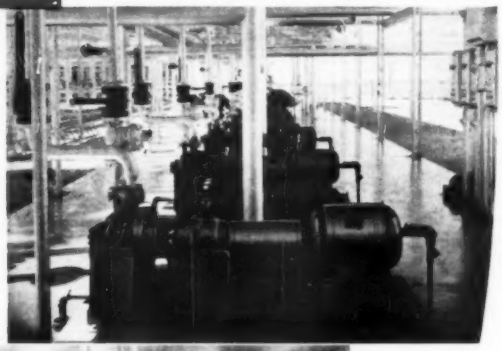


3 Eight-Stage Type JB Pumps on lean oil service. Each pump fitted with 3 discharge nozzles. 176 GPM at 302 psi – 2nd stage. 86 GPM at 802 psi – 6th stage. 408 GPM at 1000 psi – 8th stage.

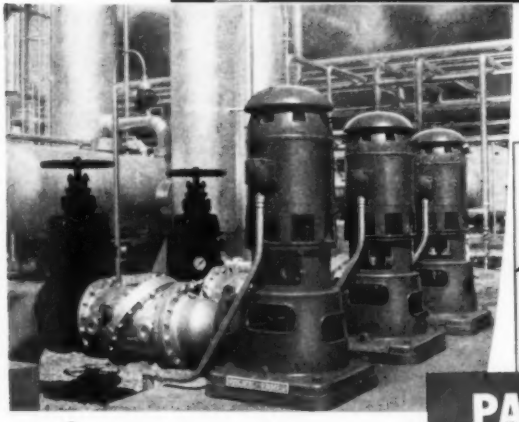
33

PACIFIC *Precision Built* PUMPS

SELECTED BY WARREN PETROLEUM CORPORATION FOR MAYSVILLE • • • ANTIOCH • • • LINDSAY



24 Single and Two-Stage Pumps Types SVC . . . SEC . . . DH and RVC handle – Lean Oil . . . Rich Oil . . . Gasoline . . . Propane . . . Butane . . . Ethane.



6 Type CT Pumps are in Cooling Tower Service.

Pacific Pumps inc.

ONE OF THE DRESSER INDUSTRIES

HUNTINGTON PARK, CALIFORNIA

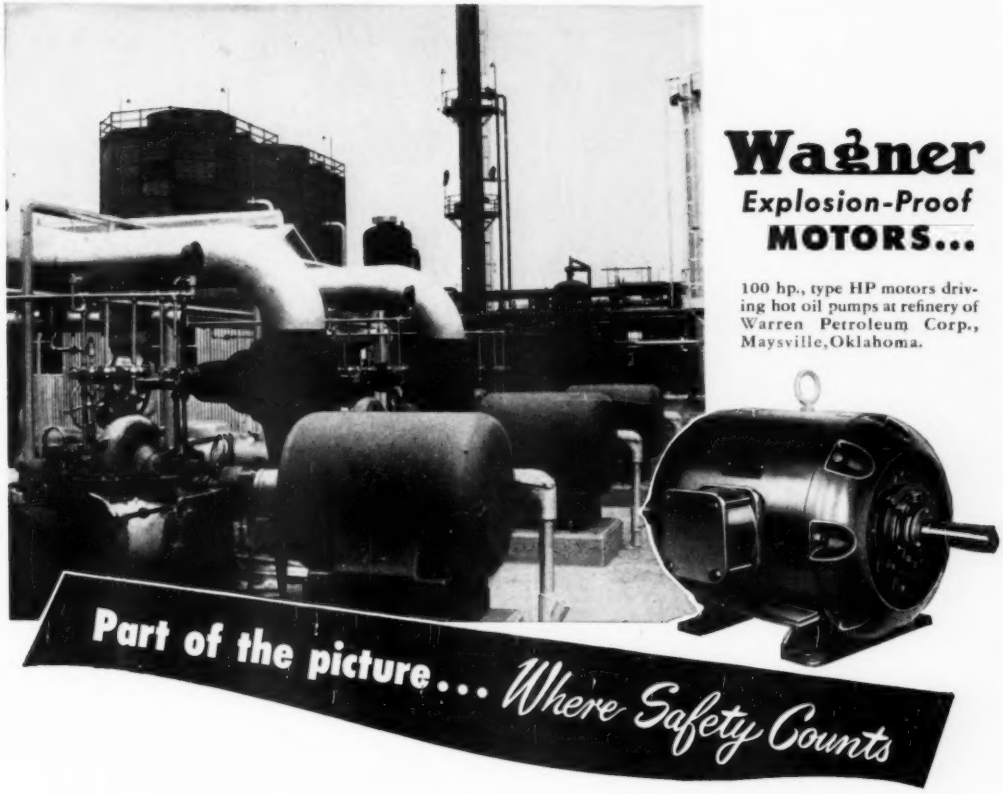
Export Office: Chanin Bldg., 122 E. 42nd St., New York

Offices in All Principal Cities

PACIFIC *Precision Built* **PUMPS**

WRITE FOR BULLETIN 1

PR-8



Wagner
Explosion-Proof MOTORS...

100 hp., type HP motors driving hot oil pumps at refinery of Warren Petroleum Corp., Maysville, Oklahoma.

Part of the picture... Where Safety Counts

You'll find thousands of Wagner type HP Motors on the job in the petroleum industry. There's a mighty good reason—the Wagner type HP Explosion-Proof Motor is specifically designed to operate economically and *safely* in surroundings where open type motors are hazardous. It has been fully tested and approved by Underwriters' Laboratories for Class I Group D hazardous locations.

But meeting Underwriters' standards is not the only factor considered in the building of these motors—they are designed by Wagner to give many years of dependable, troublefree service under the most severe operating conditions.

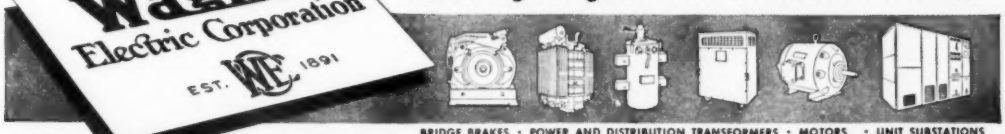
If the atmosphere in your plant contains explosive gases, fumes, vapors or combustible substances, investigate the safety and long service qualities of Wagner type HP Motors.

Twenty-nine branch offices, located in principal cities, are ready to help you whenever you have a motor problem. Users of Wagner Motors also profit by nationwide service facilities. Write for Bulletin MU-185 for information on the complete line of Wagner Motors.

Wagner Electric Corporation

6389 PLYMOUTH AVE., ST. LOUIS 14, MO., U. S. A.

Consult Wagner Engineers on all Electric Motor Problems



BRIDGE BRAKES • POWER AND DISTRIBUTION TRANSFORMERS • MOTORS • UNIT SUBSTATIONS

ELECTRICAL EQUIPMENT AND AUTOMOTIVE BRAKE PRODUCTS

13 Brown Fintube sectional exchangers in Warren Petroleum's Maysville Plant

● For the utmost in efficiency and economy, standardize on Brown Fintube's proven, welded fintube sectional heat exchangers. They give users unlimited flexibility to meet changes in duties, never are "obsoleted" by plant rearrangements. Their flanged head end construction, and metallic sealing ring, assure tight leak-proof closure, avoiding the operating troubles of screw union construction.

Continuous operation, without down-time for cleaning—Interchangeable parts that reduce the stores investment—Easy maintenance, using standard tools—Quick delivery, only a few hours in case of emergency—and double extra corrosion allowance, resulting in longer tube life; are other advantages.

Estimates and quotations furnished promptly. Write for Bulletin No. 481. It gives full details.

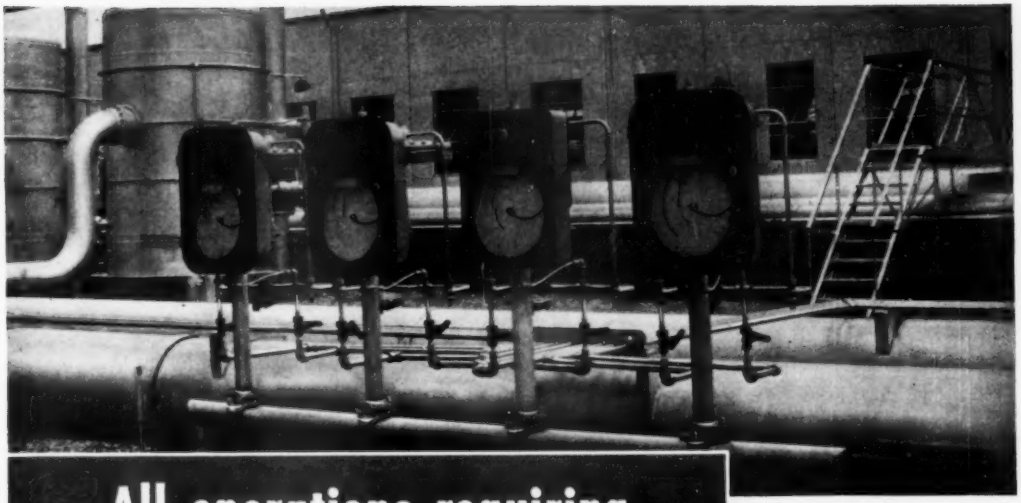
On these Duties:

- Still Stripping Heaters (2 units)
- Still Stripping Ethane Heaters (2 units)
- Depropanizer Feed Heat Exchanger
- Debutanizer Feed Heat Exchanger
- Control and Instrument Dehydrator Regeneration Air Heater
- Raw Gasoline Dehydrator Regeneration Heater
- Residue Gas Dehydrator Regeneration Gas Heater
- Control and Instrument Dehydrator Regeneration Air Cooler
- Compressed Air Cooler (Instrument and Control)
- Compressed Air Cooler (Starting Air)
- Oil Reclaimer Stripping Vapor Heater

THE BROWN FINTUBE CO.
ELYRIA, OHIO

SECTIONAL HAIRPIN HEAT EXCHANGERS

ENGINEERING AND SALES REPRESENTATIVES IN NEW YORK • BOSTON • PHILADELPHIA • CHICAGO • BUFFALO • PITTSBURGH DETROIT • CINCINNATI • BIRMINGHAM • MEMPHIS • NEW ORLEANS • TULSA • HOUSTON • SAN FRANCISCO AND LOS ANGELES

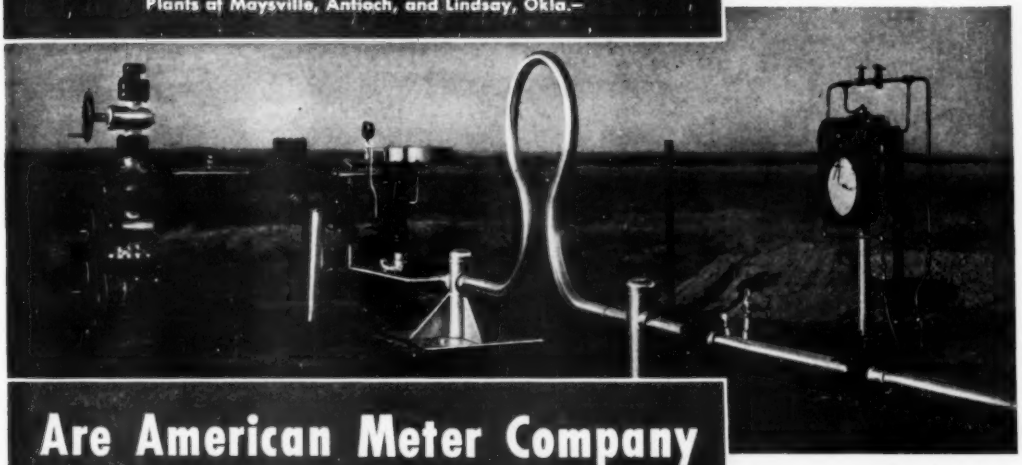


All operations requiring Orifice Meters

(APPROXIMATELY 300)

At the Ultra-Modern Warren Petroleum Company Plants at Maysville, Antioch, and Lindsay, Okla.—

Line-up of American Meter Company Orifice Meters Measuring Gas from the Field to the Plant.



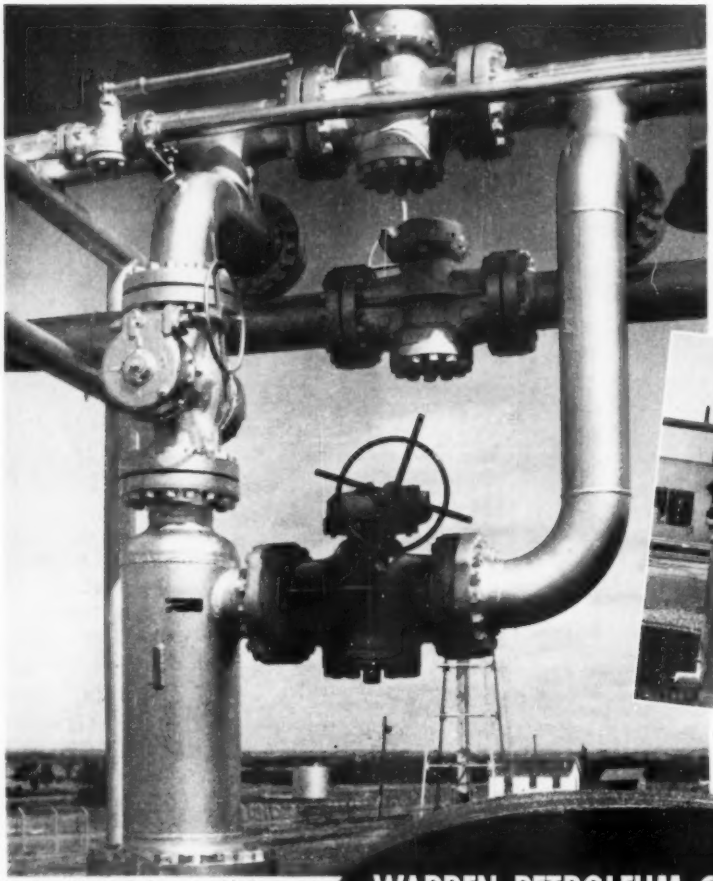
Are American Meter Company Metric Orifice Meters

"American" Metric Orifice Meters are used as Standard Equipment by numerous companies including many other Warren Petroleum Company Plants.

One of "American's" 2500 lb. W.P. Metric Orifice Meters on Station Input or Injection Well.

AMERICAN METER COMPANY
INCORPORATED (ESTABLISHED 1836)

60 East 42nd Street • New York 17, N. Y. • Albany • Alhambra • Atlanta • Baltimore • Birmingham • Boston • Chicago • Dallas • Denver • Erie • Fort Lauderdale • Houston • Joliet • Kansas City • Los Angeles • Minneapolis • Odessa • Philadelphia • Pittsburgh • San Francisco • Tulsa • In Can.—Canadian Meter Co., Ltd., Hamilton, Ont.



Nordstrom Hypreseal valves on gas dehydrator unit in Maysville plant.

One of the finest and most successful engineering projects of 1949, comprising three plants in Maysville, Antioch and Lindsay, Oklahoma.

Nordstrom 4 and 6-inch gear operated valves in heat exchanger in Maysville plant.

MODERN DESIGNING
MODERN CONSTRUCTION
MODERN VALVING

WARREN PETROLEUM COMPANY'S
ULTRA-MODERN
MAYSVILLE AREA PLANTS
equipped with
NORDSTROM VALVES

Ultra-modern designing called for Nordstrom lubricated valves. Warren's gasoline, pressure maintenance, water treating, gas dehydration, compressor and many other units in this outstanding project are Nordstom equipped. *Keep upkeep down*—use genuine Nordcoseal and Hypermatic* lubricants.

NORDSTROM VALVE DIVISION—Rockwell Manufacturing Co.

400 N. Lexington Ave.
PITTSBURGH 8, PA.

*Trade Mark

Atlanta, Boston, Chicago, Columbus, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco, Seattle, Tulsa—also leading supply houses. Export: Rockwell Manufacturing Company, International Division, 7701 Empire State Building, New York 1, N.Y.

WARREN PETROLEUM CORPORATION DRIES BOTH LIQUID AND GAS WITH ALCOA ACTIVATED ALUMINA

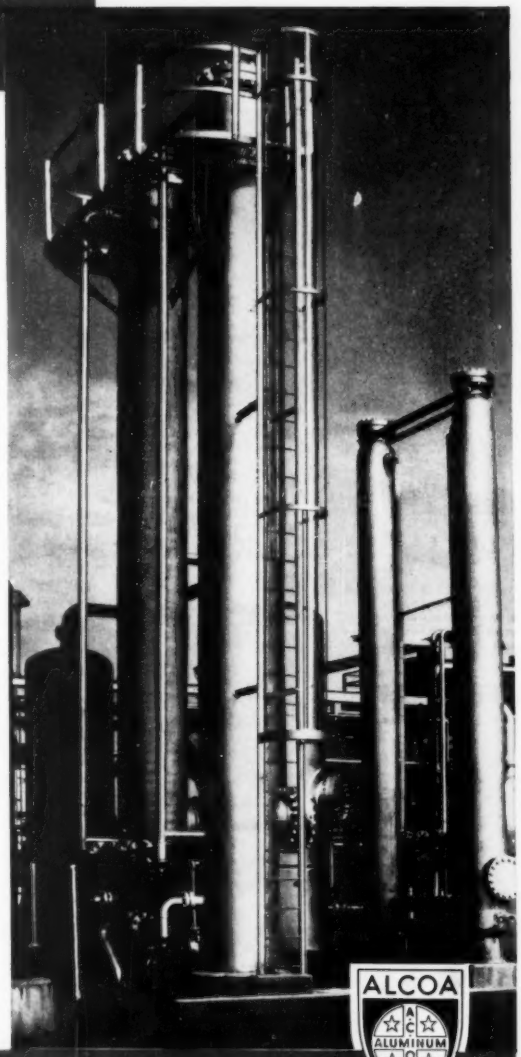
Because ALCOA Activated Alumina is economical for dehydrating both liquids and gases, Warren Petroleum Corporation uses it to dry liquid propane and residue gas to *minus* 40° F. dew point, at their Holliday, Texas, plant.

The larger pair of towers in the photograph are the residue gas dehydrators through which approximately 13 million standard cubic feet of gas is passed per day at a working pressure of 800 psig. Gas enters the towers at 80° F. to 90° F. Regeneration is accomplished in 4 hours with natural gas heated to 380° F., after which the tower is cooled before being put on stream.

The smaller pair of towers dehydrate 35,000 gallons of liquid propane per day at a working pressure of 215 psig. The liquid enters the towers at 80° F. to 90° F. Natural gas, heated to 380° F., is used for regeneration.

This is a typical example of ALCOA Activated Alumina "at work"—a desiccant that dries *both* liquids and gases quickly and efficiently. It also adsorbs certain gases and vapors from gaseous mixtures. Let us tell you more about this versatile drying agent. Write to: ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 1967L Gulf Building, Pittsburgh 19, Pennsylvania.

Dehydrating units at Warren Petroleum Corporation, Holliday, Texas. Towers at left dry residue gas. Those at right dry liquid propane. All four towers charged with Alcoa Activated Alumina.



ALCOA CHEMICALS

ALUMINAS AND FLUORIDES

ACTIVATED ALUMINAS • CALCINED ALUMINAS • LOW SODA ALUMINAS • TABULAR ALUMINAS • HYDRATED ALUMINAS

ALUMINUM FLUORIDE • SODIUM FLUORIDE • SODIUM ACID FLUORIDE • FLUOBORIC ACID • CRYOLITE

Come to POWELL for ALL your Valves

Fig. 6061—Class 600-pound Cast Steel Swing Check Valve.

There are obvious disadvantages in buying flow control equipment from several different sources. Then why get your bronze or iron valves from one place, your steel valves from another, and possibly corrosion-resisting valves from several others, when Powell *makes them all**?

This is an age of specialization; and whereas various manufacturers are emphasizing valves that meet certain flow control requirements, Powell specializes in making valves to meet *all* the demands of every branch of Industry. And there's only one standard of quality at Powell—to make the right valve to suit the service, and to make it the best.

Plants representing every branch of Industry have found that it pays to make Powell—and *only* Powell—responsible for the performance of all their flow control equipment. So why not come to Powell for all *your* valve requirements?

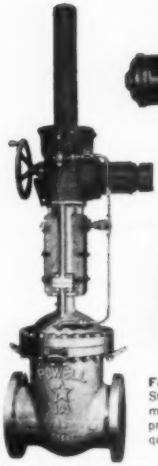


Fig. 3023—Class 300-pound Cast Alloy Steel Gate Valve with automatic steam sealing mechanism. Has explosion proof electric motor operator.

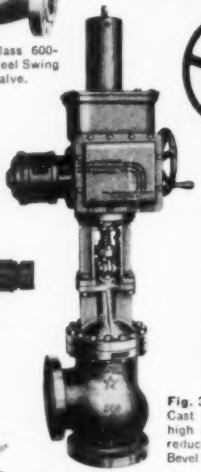


Fig. 3053 — Class 300-pound Cast Steel Angle Valve, equipped with top-mounted, fully enclosed, explosion-proof, electric motor operator for quick, positive opening and closing.

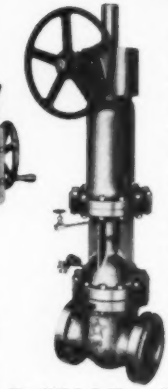


Fig. 3003 S. S. Mod.—Class 300-pound Cast Alloy Steel Gate Valve for ultra-high temperatures. Has cooling fins to reduce temperature in the stuffing box. Bevel gear operated.

Fig. 241—Large 125-pound Iron Body Bronze Mounted O. S. & Y. Globe Valve.

Fig. 8150—Bronze L. P. G. Globe Valve with screwed ends, union bonnet and special composition disc.

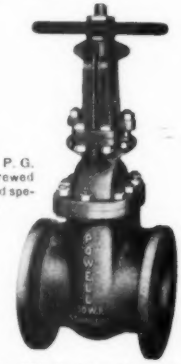


Fig. 2453-G—Large 150-pound Stainless Steel O. S. & Y. Gate Valve. Sizes 5" to 30".

Fig. 1793—Large 125-pound Iron Body Bronze Mounted O.S.& Y. Gate Valve.

Fig. 1708 — 200-pound Bronze Globe Valve with renewable stainless steel seat and regrindable, renewable "Powellium" nickel-bronze disc. *

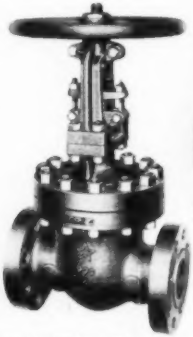


Fig. 9003—Class 900-pound Cast Steel O.S.& Y. Gate Valve.

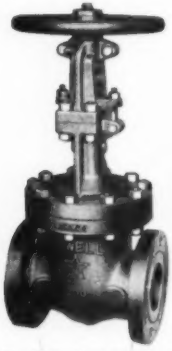


Fig. 3003—Class 300-pound Cast Steel O. S. & Y. Gate Valve.

*** Powell Valves are made in Bronze, Iron, Steel and a wide selection of Corrosion-Resistant metals and alloys. Valves of every type—Globe, Angle, Gate, Check, Non-return and Flush Bottom Tank Valves—are included in the Complete Powell Line.**

Fig. 1314-A — Class 1500-pound Steel Integral Bonnet "Y" Valve. Also made in Globe and Angle patterns.

Fig. 375 — 200 - pound Bronze Gate Valve with renewable "Powellium" nickel-bronze disc.

The Wm. Powell Co., Cincinnati 22, Ohio

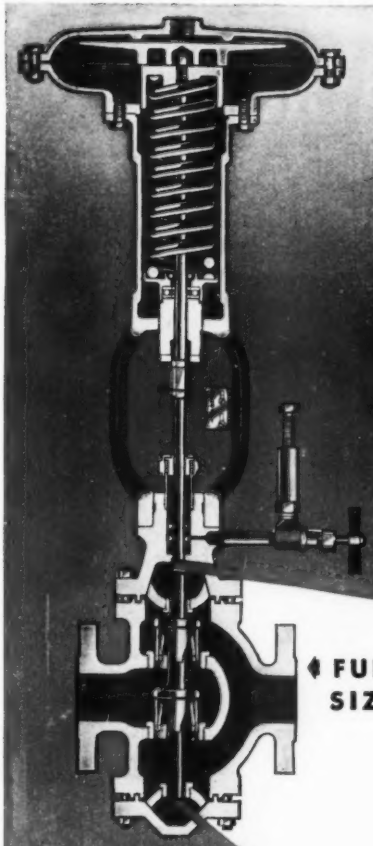
DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

POWELL VALVES

RESTRICTED INNER VALVE PROCEDURE FOR FISHER DIAPHRAGM CONTROL VALVES . . . . . .

The introduction of Fisher's new restricted inner valves offers a quick, economical and completely satisfactory way to reduce the effective capacity of a larger nominal valve size.

INTERCHANGEABLE



FULL SIZE

1 SIZE SMALLER

2 SIZES SMALLER

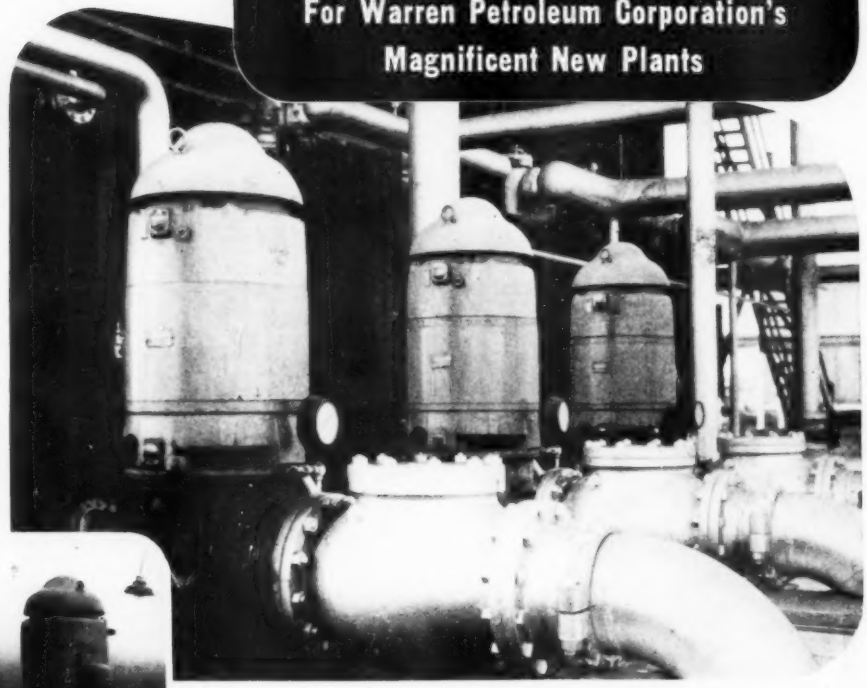
PRACTICAL

For example, a 4" valve can quickly be converted to flow capacity of a 3" 2½", or 2" size. This is accomplished by the restricted V-Port Inner Valve alone—without changing seat rings. Inner valves with equivalent smaller size valve area or capacity are fully interchangeable with standard full size inner valves. Inner valve skirts are cast stainless steel with wide range percentage characteristics port areas. Cast skirts are welded on to stainless steel bar stock center post guide. Further details and application data gladly furnished on request.

FISHER GOVERNOR COMPANY MARSHALLTOWN IOWA

8 BIG LAYNE PUMPS

For Warren Petroleum Corporation's Magnificent New Plants



FOR COOLING TOWER AND GENERAL USE

Layne Vertical Turbine Pumps are almost always first choice for petroleum plant cooling tower and general use. They are tough enough to stand continuous heavy load production and still maintain their exceptionally high efficiency. Sizes range from 40 to 16,000 gallons per minute. Write for the Layne Vertical Turbine pump catalog.

Here is another case where a great petroleum processer has selected pumping equipment upon its proved merit of high efficiency, rugged quality and long life. The eight big Layne Vertical Turbine Pumps will give an excellent accounting of themselves. They are built to produce tremendous quantities of water at exceptionally low operating cost, and as time will tell, they will be in there humming along for years and years to come. Furthermore, they will be singularly free of repair expense. Such is the record wherever these fine pumps are installed. Congratulations to the Warren Petroleum Corporation and may their further growth and success be unlimited.

LAYNE & BOWLER, INC.

GENERAL OFFICES, MEMPHIS 8, TENN.

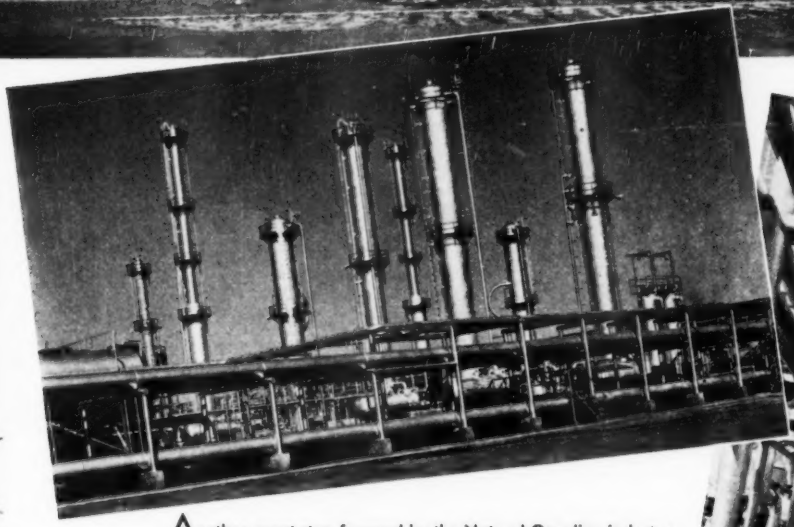
ASSOCIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. • Layne-Atlantic Co., Norfolk, Va. • Layne-Central Co., Memphis, Tenn. • Layne-Northern Co., Mishawaka, Ind. • Layne-Louisiana Co., Lake Charles, La. • Louisiana Well Co., Monroe, La. • Layne-New York Co., New York City • Layne-Northwest Co., Milwaukee, Wis. • Layne-Ohio Co., Columbus, Ohio • Layne-Pacific, Inc., Seattle, Washington • The Layne-Texas Co., Ltd., Houston, Texas • Layne-Western Co., Kansas City, Mo. • Layne-Minnesota Co., Minneapolis, Minn. • International Water Corporation, Pittsburgh, Pa. • International Water Supply, Ltd., London, Ont. • Layne-Hispano Americana, S.A., Mexico, D.F. • General Filter Company, Ames, Iowa.

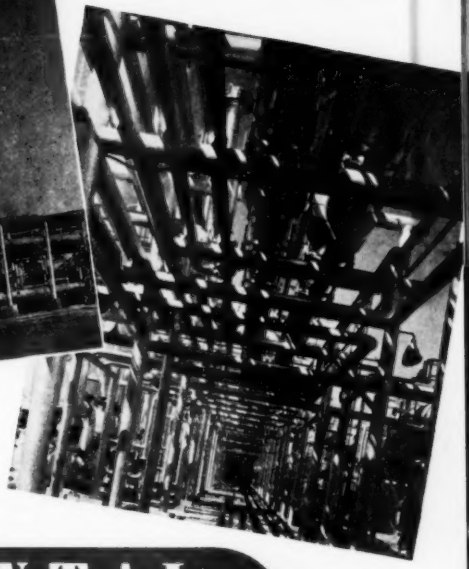
LAYNE

VERTICAL TURBINE PUMPS

From Any Angle THE GREEN TRIANGLE *is There...*

Serving THE NATURAL GASOLINE INDUSTRY





Another great step forward by the Natural Gasoline industry . . . the ultra-modern Warren Petroleum Corporation plants in the Maysville, Oklahoma area. Continental takes justifiable pride in having contributed to their completion and successful operation.

CONTINENTAL

SERVING THE OIL AND GAS INDUSTRIES

THE CONTINENTAL SUPPLY COMPANY, *General Offices:* DALLAS, TEXAS

THE CONTINENTAL SUPPLY COMPANY, LIMITED
216 Lancaster Building **Calgary, Alberta**

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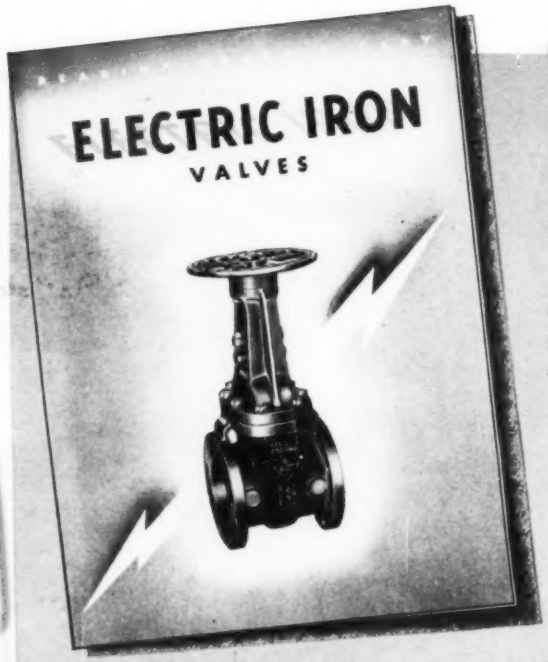
Representatives: ARGENTINA • BOLIVIA • BRAZIL • CHILE • COLOMBIA • ENGLAND • ECUADOR • PERU • TRINIDAD • URUGUAY • VENEZUELA

BETTER IRON MAKES BETTER VALVES AT READING-PRATT & CADY

WARREN PETROLEUM CORPORATION plants in the Maysville area use many Iron Gate Valves, as well as Cast Steel and Bar Stock Valves, made by R-P & C.

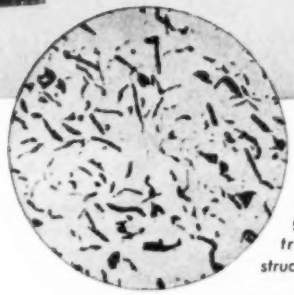


YOU PAY NO PREMIUM for the extra quality in R-P&C Electric Iron Valves. But you do get better valves — longer lasting, more dependable.

Electric Furnace Cast Iron is a low-sulphur, low-phosphorus iron of homogeneous, fine-grained structure. It is clean and of uniform quality.

Before buying or specifying iron valves, get the complete story of R-P&C Electric Furnace Iron. Write for our descriptive folder—DH-18.

THIS FOLDER tells you why Electric Iron is better than iron made by the conventional cupola process. Interesting information if you buy or specify iron valves. Write for DH-18.



UNIFORM STRUCTURE
Photomicrograph (enlarged 100 times) shows even distribution of fine graphite flakes. This contributes to the uniform structure of R-P&C Electric Iron.

ACCO

Reading, Pa. • Atlanta • Baltimore • Boston • Chicago • Denver • Detroit • Houston
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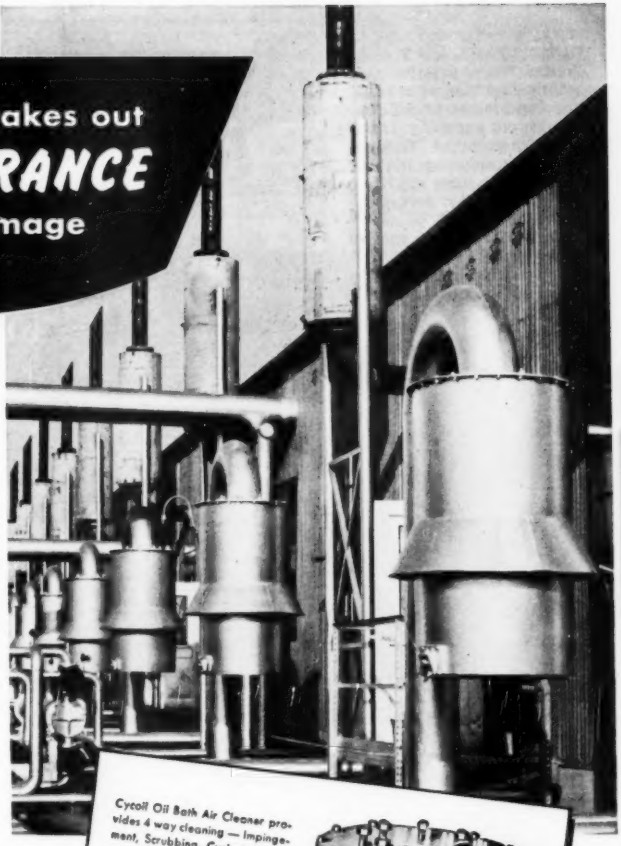
READING-PRATT & CADY DIVISION
AMERICAN CHAIN & CABLE

READING-PRATT & CADY VALVES

Warren Petroleum takes out

CYCOIL INSURANCE

against dust damage



Engines at new Maysville, Antioch and Lindsay, Okla. plants equipped with this proven oil bath air cleaner.

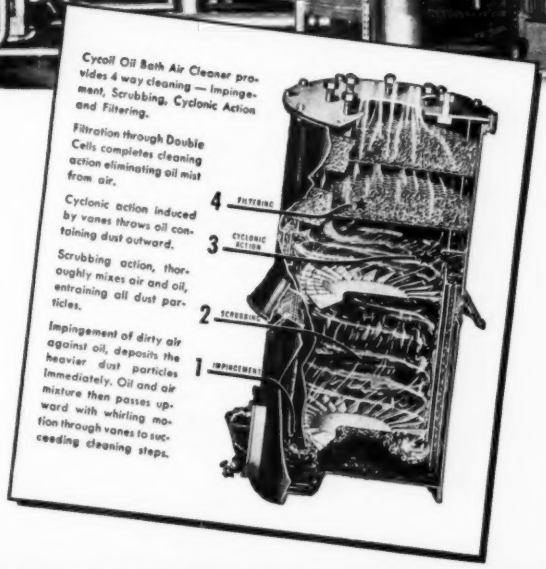
THE recently completed Field Processing operation of Warren Petroleum Corporation and associates actually consists of three plants at Maysville, Antioch and Lindsay, Okla. At each location, Cycoils* are on the job. Pictured here are those units installed at Antioch for the protection of twelve 600 H.P. engines.

Cycoil insurance pays off in the form of dollars you *won't* spend for engine repairs due to dust damage. And you can count on these savings, too, because Cycoils do a *complete* job. Over 90% of the total fine dust content of the air is trapped by the oil bath action of the Cycoil even before reaching the filter pads. Positive oil circulation for continuing self-cleaning action, plus the added filtration to be had in the filter pads, assures approximately 100% clean air.

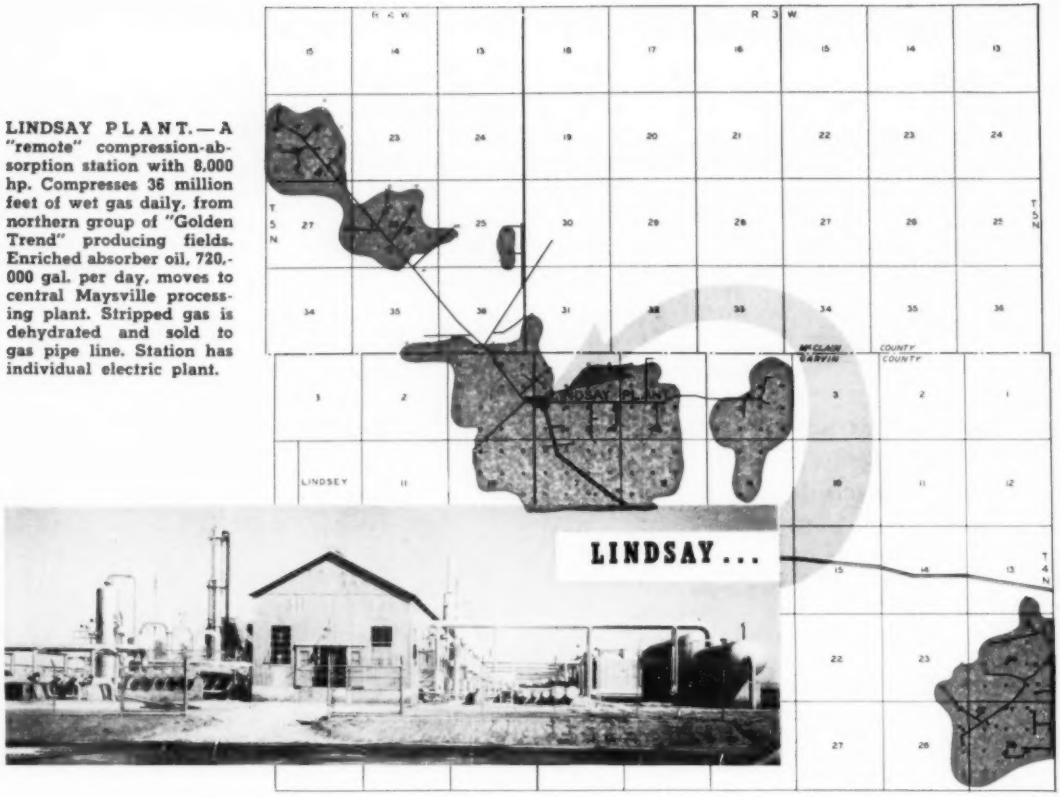
Bulletin 130-D tells you why Cycoil has set the standard for positive, permanent protection against dust. Write for your copy today.

AMERICAN AIR FILTER COMPANY, INC.
444 Central Avenue, Louisville 8, Ky.
In Canada: Darling Bros., Ltd., Montreal, P.Q.

*Trade mark registered U. S. Patent Office


Cycoil Oil Bath Air Cleaner provides 4 way cleaning — Impingement, Scrubbing, Cyclonic Action and Filtering.
Filtration through Double Cells completes cleaning action eliminating oil mist from air.
4 FILTERING
Cyclonic action induced by vanes throws oil containing dust outward.
3 CYCLONIC ACTION
Scrubbing action, thoroughly mixes air and oil, entraining all dust particles.
2 SCRUBBING
Impingement of dirty air against oil, deposits the heavier dust particles immediately. Oil and air mixture then passes upward with whirling motion through vanes to succeeding cleaning steps.
1 IMPINGEMENT

AAF Cycoil OIL BATH AIR CLEANER
AND INTAKE SILENCER



LINDSAY PLANT.—A "remote" compression-absorption station with 8,000 hp. Compresses 36 million feet of wet gas daily, from northern group of "Golden Trend" producing fields. Enriched absorber oil, 720,000 gal. per day, moves to central Maysville processing plant. Stripped gas is dehydrated and sold to gas pipe line. Station has individual electric plant.

FIVE COMPANIES JOIN IN Major COOPERATIVE CONSERVATION Program IN THE GOLDEN TREND AREA

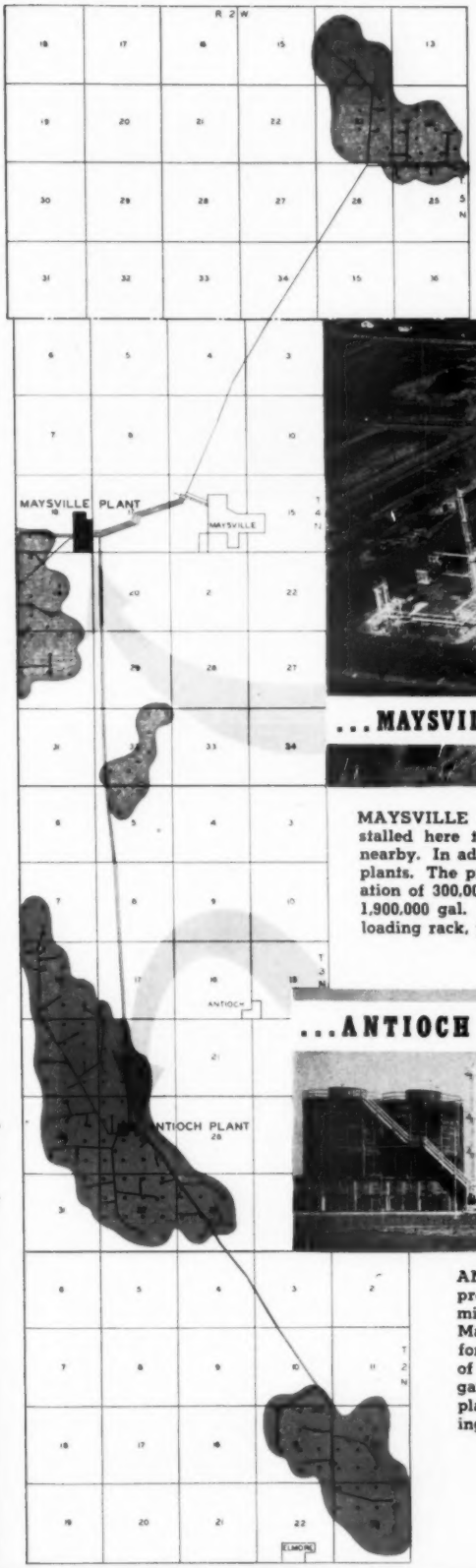
FIVE companies holding substantial interests in the newest major oil and gas-producing sector in the State of Oklahoma, the "Golden Trend area," have joined together in the installation of the "Garvin County Plants." The Golden Trend area is located in Garvin and McClain counties.

Companies joined in the Garvin County Plants project are Carter Oil Co., Cities Service Oil Co., J. E. Crosbie, Inc., Texas Co., and the operator, Warren Petroleum Corp. The Garvin County Plants are comprised of two remote stations—one at Antioch and one at Lindsay—and a central processing plant at Maysville. These operate as an integrated unit or single large processing plant.

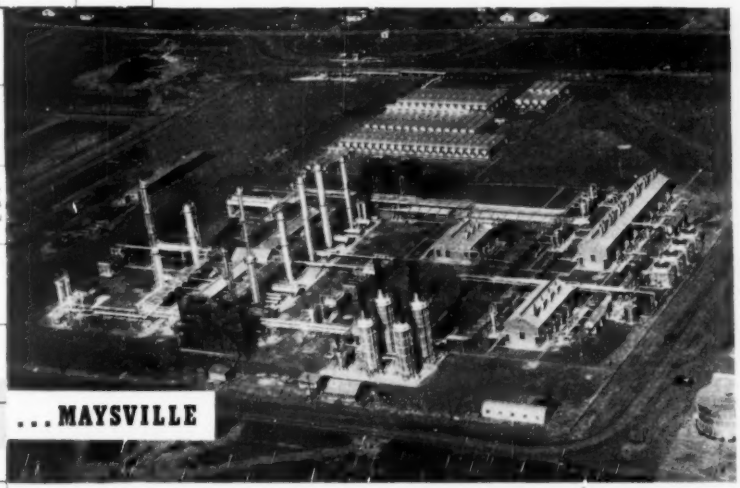
The unit plant operation is achieved by continuous circulation of the absorption oil between Antioch and Maysville, a distance of approximately 7½ miles, and between Lindsay and Maysville, also a distance of 7½ miles. The enriched absorption oil from both the Antioch and Lindsay stations is commingled with the rich absorption oil from the absorption section of the Maysville plant for final processing through the distillation and fractionation sections of the latter plant.

Discovery of oil and gas production in the Golden Trend area was in February 1946. This area now has approximately 700 oil and gas wells covering some 25,000 productive acres. Development has steadily progressed within individual pool areas, and with new pools being found from time to time. There is now an extended oil producing strip some 30 miles in length and 1 to 3 miles in width. The individual pools are North Lindsay, East Lindsay, New Hope, Southwest Maysville, Southwest Wayne, N.E. Elmore City, Southwest Antioch, and Katie.

A large number of rigs continue development throughout the area.



THESE ARTICLES ON THE GARVIN COUNTY PLANTS WERE PREPARED BY THE TECHNICAL DEPARTMENT, MANUFACTURING DIVISION, WARREN PETROLEUM CORP., H. W. HARTS, VICE PRESIDENT. THE TEXT WAS WRITTEN BY BERT J. THOMPSON, PROCESS ENGINEER OF THIS DIVISION OF WARREN, IN COLLABORATION WITH HARTS, C. H. BRADY, PROJECT ENGINEER FOR THIS INSTALLATION, REX LANE, CHIEF ENGINEER, AND OTHERS IN THE WARREN ORGANIZATION.



...MAYSVILLE

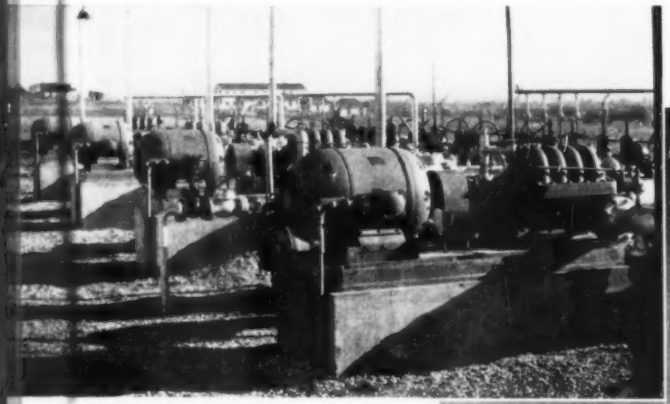
MAYSVILLE CENTRAL PLANT.—Compression and absorption facilities are installed here to process the wet gas available from certain fields immediately nearby. In addition, Maysville has the central processing equipment for all three plants. The process equipment has a design capacity for extraction and fractionation of 300,000 gal. liquid products per day. Pressure storage for products totals 1,900,000 gal. Plant has individual electric station; is served by 36-unit tank-car loading rack, pipe lines, and tank-truck loading docks.

...ANTIOCH

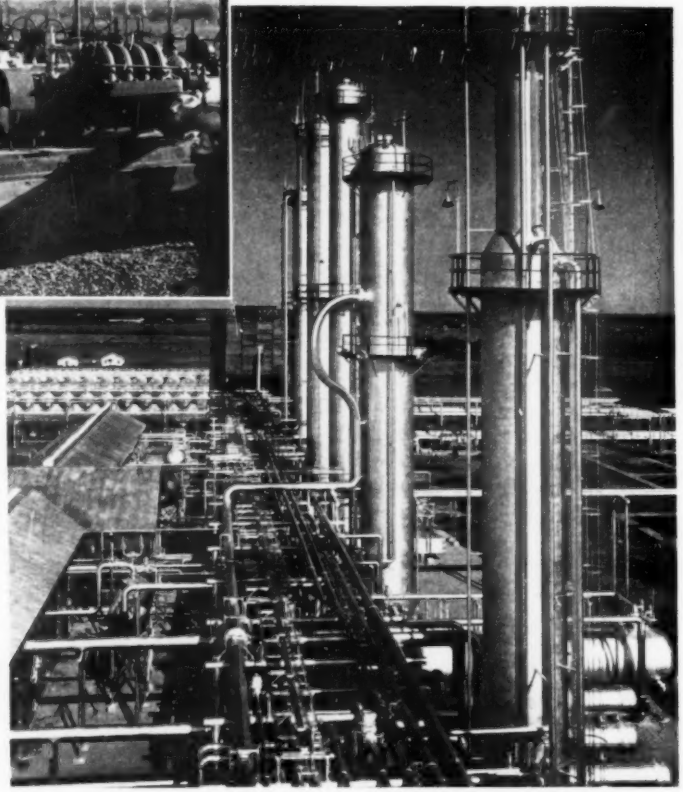
ANTIOCH PLANT.—This "remote" type compression-absorption-repressuring station has 8,400 hp. installed. Has capacity to handle 31 million cubic feet of field gas daily. Enriched absorber oil goes to Maysville. Part of stripped gas is dehydrated and further compressed for injection to reservoir (Southwest Antioch Gibson Sand Unit). Rest of stripped dehydrated gas is used for fuel and excess is sold to gas-purchasing company. Station has separate electric generating plant. South of Antioch are water-supply wells, water storage, pumping station, and point of origin of water pipe-line system to all plants.

Huge installation of pressure storage at Maysville. This pressure tankage will care for 629,000 gal. of gasoline, 690,000 gal. of propane, and 588,000 gal. of butanes, as well as 75,000 gal. of mineral seal oil. Extensive pumping equipment is installed for switching and transfer of products to railway loading rack, tank-truck loading station, and to pipe-line system

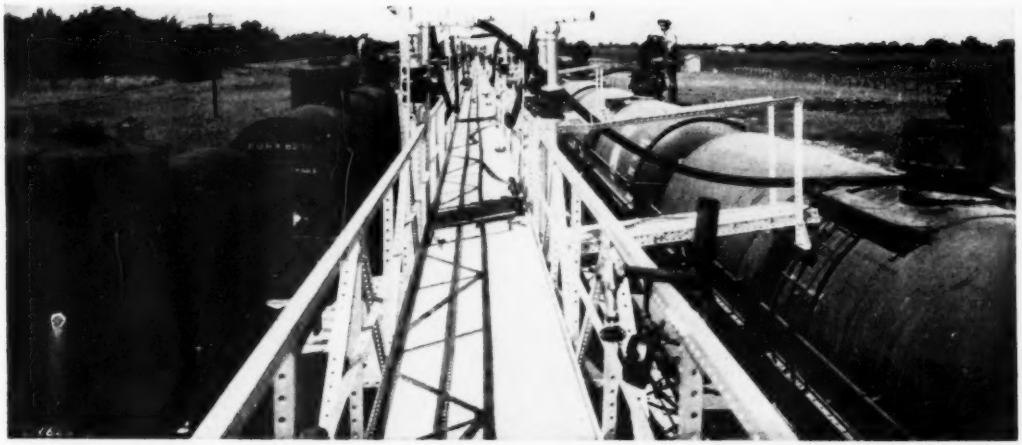
Equipment and Men . . . . At Garvin County Plants



Above: Battery of electrically driven centrifugal pumps for loading of tank cars and trucks, Maysville plant. These high-capacity transfer units are located adjacent to the pressure-storage area

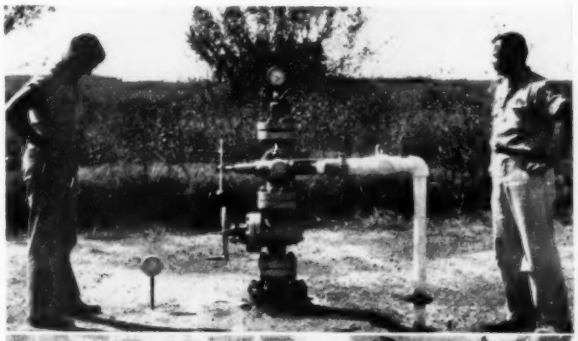


Right: Maysville plant, portion of process section. A rich-oil demethanizer appears in right foreground with still and three fractionators behind. Out of view to the left is a duplicate installation of demethanizer and still. Building in left foreground comprises the control house, with two wings sheltering the process pumps

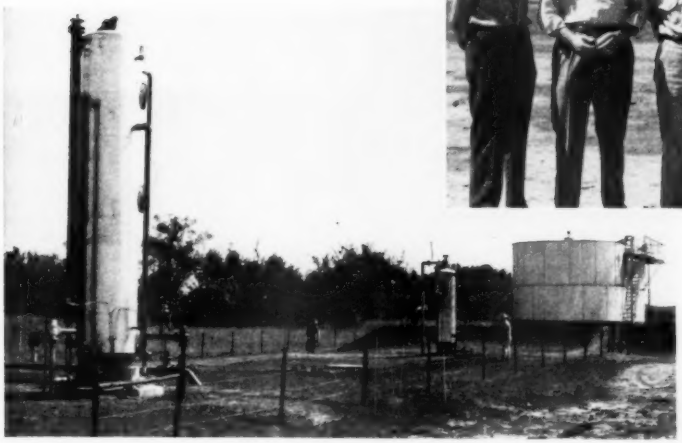


Tank-car loading rack, Maysville, Okla. This installation provides for spotting 36 tank cars; Atchison, Topeka & Santa Fe Railway. Piping system is manifolded so that natural gasoline, propane, and butanes can be loaded simultaneously to different cars. A plant-owned residence is erected nearby so that tank-car loader can be on the spot as needed. Private telephone communication is provided from the loading rack to the Maysville plant

Right: The new Garvin County Plants serve approximately 500 producing wells. This photograph shows J. C. Hawthorne well of Carter Oil Co. located in Maysville field

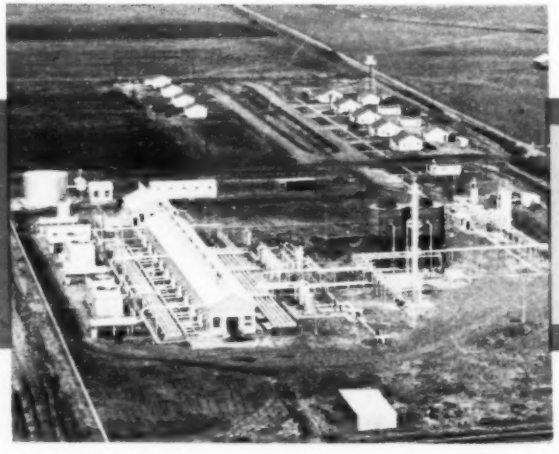


Below: Wet natural gas is separated from crude oil in the eight fields served by the Garvin County Plants, via separator-treater-tank battery units such as this. The separation-storage equipment pictured is located on a Carter Oil Co. lease



Above: Field supervisory personnel, Warren Petroleum Corp.—T. E. Raper, assistant superintendent (Maysville plant); H. J. Bourke, superintendent (Maysville); R. E. Edwards, superintendent (Lindsay); C. V. Sudderth, construction superintendent for Dresser Engineering Co.; D. J. Snyder, superintendent (Antioch); Guy Barritt, district superintendent for Warren

Maysville Plant, which in addition to handling the gas from adjacent wells contains centralized facilities for processing rich oil from the Antioch and Lindsay Plants, for recovery of propane, butane and natural gasoline of various vapor pressure.



Lindsay Compressor Station, consisting of 8,000 H.P. of Gas Compressors, Gas Dehydration Plant, Electrical Generators, and Gas Absorber.

DRESSER ENGINEERING COMPANY Established 1926

Congratulations to..

WARREN PETROLEUM CORPORATION

and Associates

THE CARTER OIL COMPANY, CITIES SERVICE OIL COMPANY, J. E. CROSBIE, INC., and THE TEXAS COMPANY

upon the completion and dedication to public service of their great Garvin County Plant — consisting of three ultra modern units located at Maysville, Lindsay, and Antioch, Oklahoma.

We consider it a privilege, indeed, to have been selected as the designers and constructors of these units.

Designers DRESSER engineering COMPANY *Constructors*

706 S. BOSTON TULSA 1, OKLA.

Antioch Compressor, Pressure Maintenance, and Remote Absorber Plant, consisting of 10,400 H.P. of Gas Compressors, Gas Dehydration Plant, Electrical Generators, and Gas Absorber.

Frank Perry, manager, gasoline department, Cities Service Oil Co.; Phil Baker, head, gasoline department, Carter Oil Co.; H. W. Harts, vice president, Warren Petroleum Corp.; J. Howard Johnson, assistant to division manager, The Texas Co. Walter Moran, president, J. E. Crosbie, Inc., represents his company in the operators' committee, but is not present in photo

VERTICAL

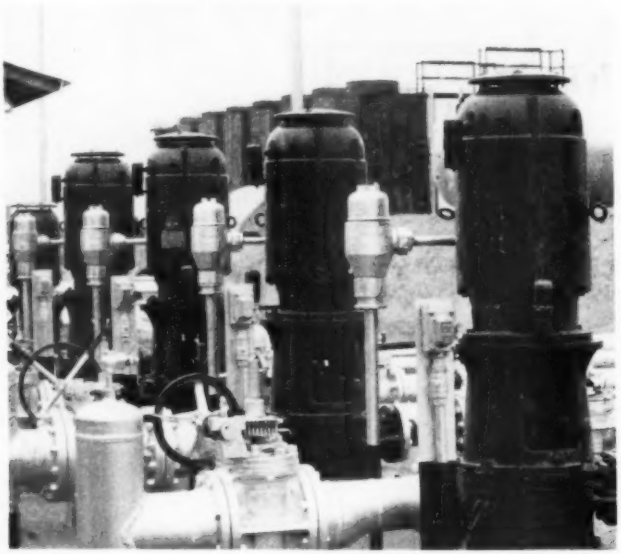
HIGH THRUST

CONTINENTAL

EXPLOSION-PROOF MOTORS

DOING THEIR JOB

AT THE NEW WARREN PETROLEUM CORP.'S GAS PROCESSING PLANT



Continental Electric Co., Inc.

MANUFACTURERS OF A COMPLETE LINE OF AC AND DC MOTORS AND GENERATORS TO 600 HORSEPOWER

NEWARK 5, N. J. • ROCKFORD, ILL.

REPRESENTATIVES IN PRINCIPAL CITIES

Pool development has been and continues to be conducted with considerable speed and precision.

In the interest of natural-resource conservation, present-day oil-pool development is not complete without (1) a natural-gas processing plant to recover hydrocarbon fractions from the separator gas, and (2) to deliver residue gas remaining after absorption either to repressuring equipment for return to the producing horizon or for sale to a gas-purchasing company for transportation and delivery to markets. Several of the small individual oil pools in the area, as a matter of fact, are not large enough to support separate natural-gas processing plants on a sound economic basis.

Large Investment in Equipment

A gas-processing operation of the size represented by the Garvin County Plants requires an enormous amount of equipment, materials, and construction work.

Extent of the equipment and construction work is evidenced by the fact that:

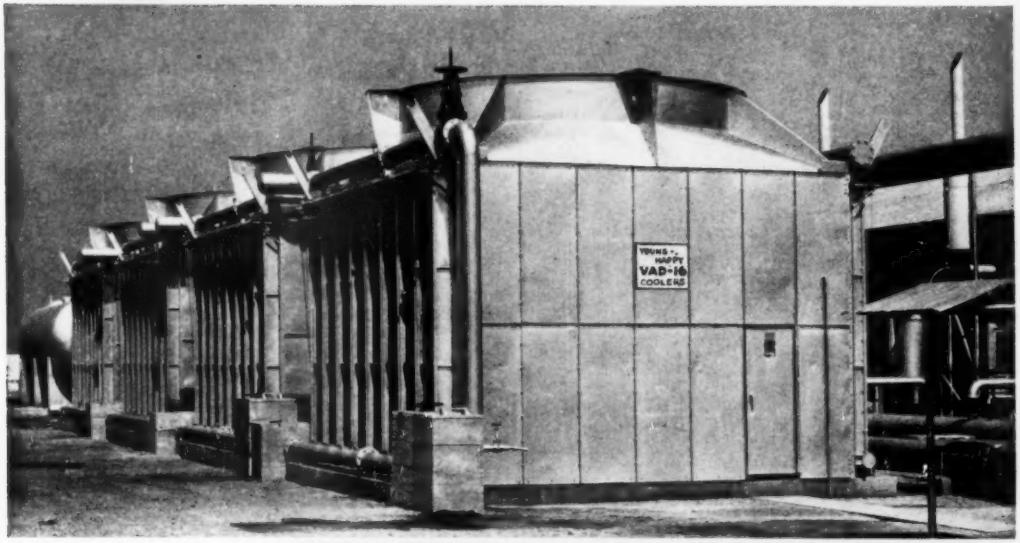
1. Approximately 200 miles of underground pipe lines, ranging from 2 to 30 in. in diameter, are required for gas gathering, gas injection, residue gas, oil, water, gasoline, and liquefied petroleum gas.

2. A total of 21,200 compressor horsepower is installed to handle in excess of 80 million cubic feet of gas per day from approximately atmospheric pressure to 760 lb. absorber pressure, and an additional average of 25 milion cubic feet of residue gas per day for reservoir injection at pressures up to 2,400 lb.

3. Approximately 8,655 gas-engine horsepower is required to drive such units as electric generators, lean-oil

12 YOUNG-HAPPY

VAD 16's REMOVE OVER 100,000,000 BTU/hr FROM THE JACKET WATER OF 33 COMPRESSORS AND 12 GENERATOR ENGINES TOTALING 27,700 H. P.



AIR COOLING DOES THE JOB AGAIN

Four of twelve VAD-16 (16' Vertical Air Discharge) Jacket Water Coolers used in the three new Garvin County Plants are shown above. More and more operators specify Young-Happy air cooling units because they are:

- RELIABLE
- ECONOMICAL
- SAFE
- TROUBLE-FREE

SERVING FOR. . .

BWH Industrial Hose
Happy Coolers
Rubber Belting
Leather Belting
Bull Dog V-Belts
Sure-Grip Sheaves
P & H Engine Starters
Safety Switches
Happy Pumping Units
Power Transmission Equipment

The HAPPY COMPANY

Formerly HAPPY BELTING COMPANY

TULSA, OKLAHOMA

30 HAPPY YEARS

BRANCH STORES:

Seminole	Oklahoma
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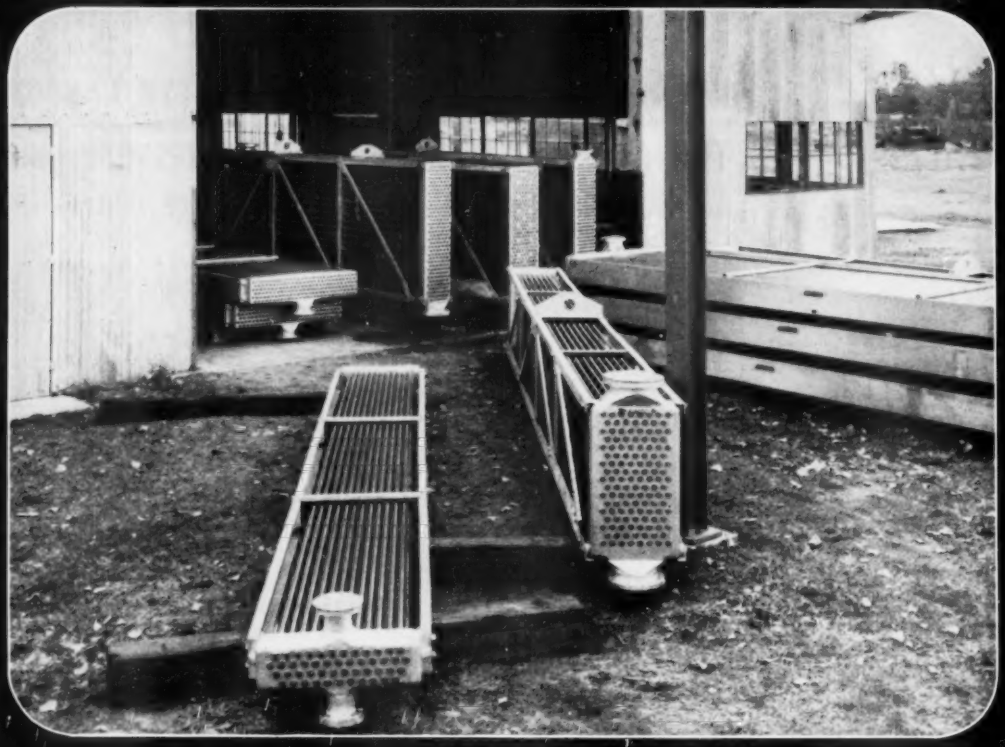
Odessa	Texas
Salem	Illinois
Ellinwood	Kansas

DISTRICT REPRESENTATIVES:

Kilgore	Texas
Wichita Falls	Texas
Wichita	Kansas



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AIMCO COOLERS

LOW PRESSURE DROP — EASE OF MAINTENANCE

HIGH SAFETY FACTOR — DURABILITY

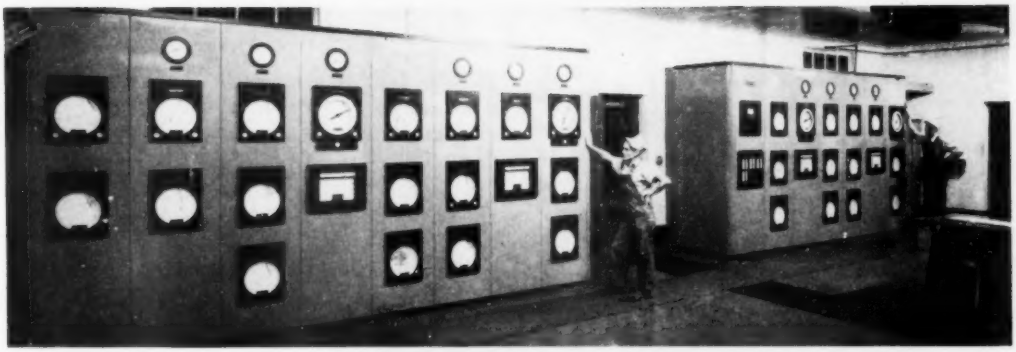
FLEXIBILITY OF DESIGN

Units range in working pressures from 150 to 5,000#. From 63 to 895 square feet of tube surface may be obtained in a horizontal unit and 392 to 2,723 square feet in a vertical unit.

ARROW INDUSTRIAL MANUFACTURING CO.

801 West 21st Street — Tulsa, Oklahoma

Sales Representation — Houston, Los Angeles, San Francisco



This view is of one-half of the main control room located at the Maysville central processing plant. Overhead fluorescent lights give good visibility to all recorders and gages. Doors behind the panels give access to the instrumentation equipment

pumps, water-system pumps, and plant vapor compressors.

4. Several thousand barrels of water are required daily despite the fact none is used for steam generation, and air cooling has been employed to the fullest extent.

5. Total liquid product recovery, at maximum efficiency, will exceed 300,000 gal. per day.

Construction of the project was started first at the Antioch plant in December 1947, due to the fact that the oil and gas producers in that vicinity were anxious to begin repressuring operations as soon as possible.

Although the design details, processing features, and equipment installations for the Lindsay, Maysville, and Antioch units will be discussed later by individual plant units, from the over-all viewpoint unusual items in the Garvin County Plants include:

1. Remote compressor and absorber stations.

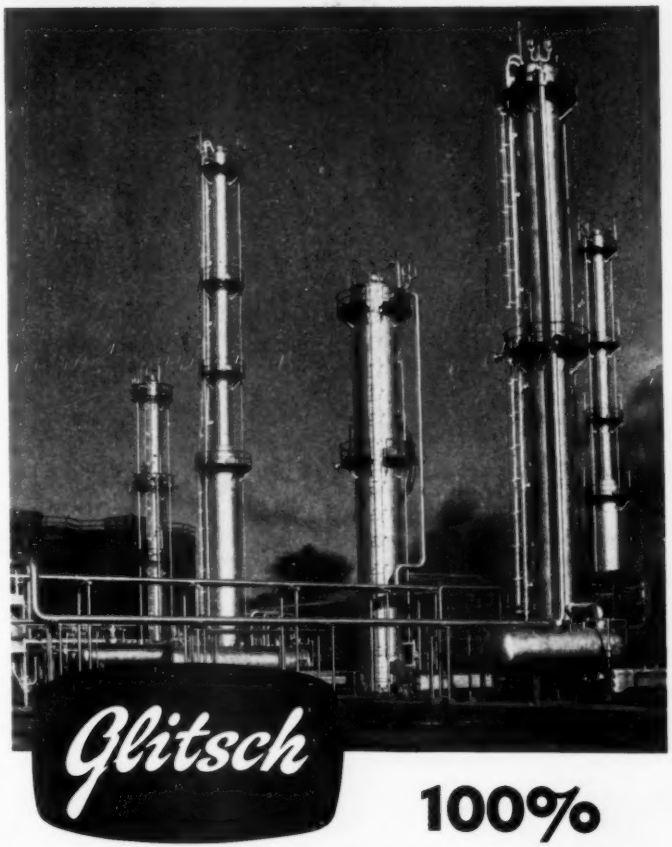
2. Direct-fired heaters for all heating (no steam plant).

3. Radiator-type air coolers to prevent excessive water makeup.

4. Parallel units to reduce fabricaton cost and provide more flexible operation.

5. Multistage centrifugal pumps which provide three lean-oil services of different pressures.

As previously mentioned, the Antioch and Lindsay sections operate as remote compression and absorption units. The enriched oil from these two absorber stations flows by pipe line to the central Maysville unit where it is commingled with the Maysville rich oil for complete processing through distillation and fractionation units to produce natural gasoline, butane, and propane. This arrangement of supplying lean oil by pipe line to two remote compression and absorption stations from a central processing plant 7 to 8 miles away is



In any refinery it's the on-stream time that counts. GLITSCH "Truss-Type" bubble trays were selected 100% for Warren to assure maximum "on-stream" performance.

FRITZ W. GLITSCH & SONS, Inc. • Box 6227 • Dallas 2

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"TRUSS-TYPE" BUBBLE TRAYS • BUBBLE CAPS • TOWERS • TOWER INTERNALS

ANSUL MODEL 30

DRY CHEMICAL

FIRE EXTINGUISHERS ARE YOUR *BEST* PROTECTION

...and most economical, too! Tests conducted by impartial, nationally recognized approval laboratories have proved the superiority of Ansul Dry Chemical Fire Extinguishers on *Flammable Liquid Fires.*

Drilling, handling, processing, transferring and storing operations for all liquid and gaseous petroleum products involve fire hazards which demand the best in first-aid fire protection. For years, all divisions of major oil companies have been using Ansul Dry Chemical Fire Extinguishers as their first line of fire defense There is a reason...

Get the facts. Send for your copy of File No. 429. You'll also receive our latest literature together with comparative rating charts for the various types of fire extinguishers.

- Safe for use on electrical fires, too! Even high voltages are not conducted by dry chemical stream.
- Can be recharged at most of fire furnishing continuing protection.
- Annual recharging is not necessary. Low maintenance costs.
- Longer range stream of dry chemical is effective in winds and drafts.
- Ansul Dry Chemical is non-abrasive, non-corrosive, non-toxic.
- Listed and Approved by Underwriters Laboratories and Factory Mutual Laboratories.

ANSUL CHEMICAL COMPANY

FIRE EXTINGUISHER DIVISION, MARINETTE, WISCONSIN

DISTRIBUTORS IN PRINCIPAL CITIES IN THE UNITED STATES, CANADA, AND OTHER COUNTRIES

one of the unusual features of the Garvin County Plants.

Other features include the direct-fired vertical heaters which provide heat for the two distillation stills and for all fractionator reboiler heating and other plant-heating requirements. This eliminates the high water requirements of the usual steam-boiler units.

Radiator-type coolers are used for all engine-jacket water cooling. Aerial cooler units are used for still and debutanizer primary condensing. These installations insure a minimum of cooling-water losses as contrasted to those generally experienced with water-cooling towers.

Rich-oil demethanization prior to distillation and fractionation serves to decrease both the still load and the raw-product make-tank vapors (recompressor load), and also is a factor in lower deethanizer tower operating pressure. The rich-oil demethanization likewise is a major factor in high propane recovery. Two parallel units, for both rich-oil demethanizing and distillation, have been used in this plant to avoid excessive tower diameters and for increasing flexibility of operation.

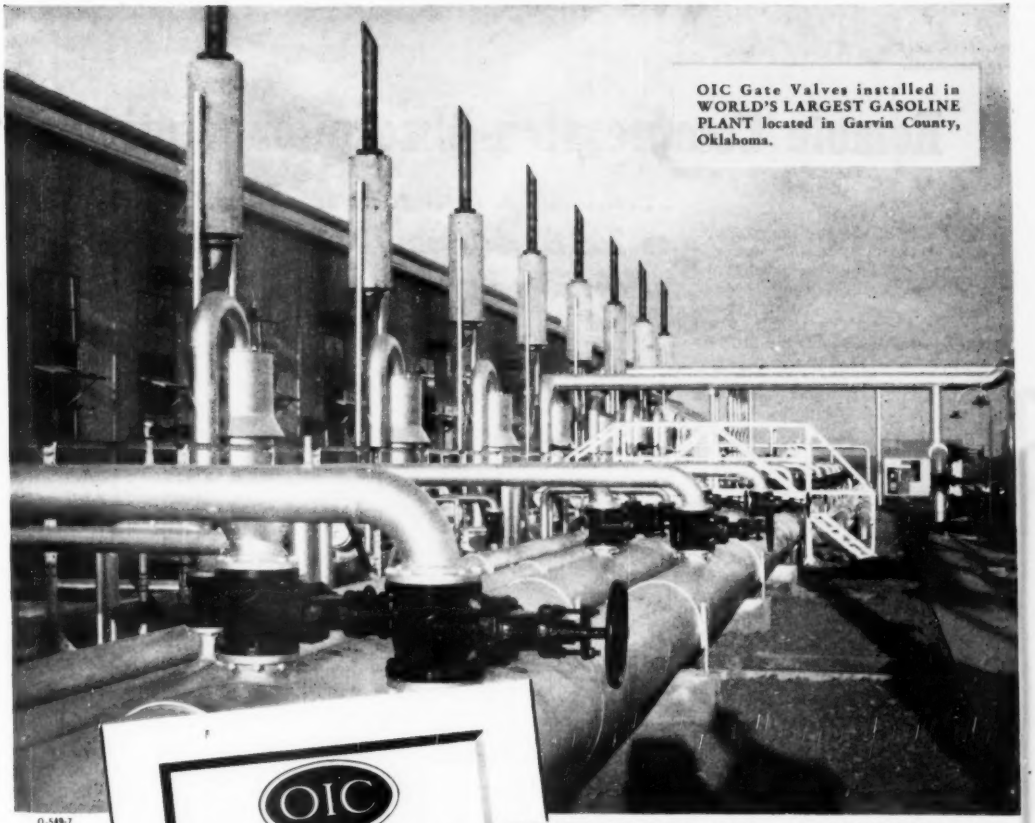
Three Centrifugal Pumps

There are three eight-stage centrifugal pumps driven by 505-hp. gas engines which supply all lean-oil requirements for the Garvin County Plants (one unit serves as standby for the two operating units). The unusual feature of these pumps is that three separate pressure and quantity requirements are provided by the same pump. Discharge from the second stage supplies oil to the rich oil-demethanizing towers. Another discharge stream from the sixth stage provides lean oil to the Maysville primary absorber, while the final or eighth-stage discharge stream at 1,000 psig. flows by pipe line to the Antioch and Lindsay absorbers.

Outlets for dehydrated residue gas from the absorbers include plant and lease fuel, sales to a gas pipe line, and repressure gas.

The initial compressor installation was designed to handle a volume of 80,500 M.c.f. per day requiring a total gas-engine installation of 19,200 hp. The original design also included facilities to produce approximately 300,000 gal. per day of total product based on weighted gas analysis from Golden Trend production during late 1947 and early 1948. In addition to the gas-engine horsepower required for gas compressors, some 8,655 gas-engine horsepower serves to drive such units as electric generators, lean-oil pumps, water-system pumps, and plant vapor compressors, and 2,000 hp. for gas repressure units. The grand total gas-engine horsepower is 29,855.

Water storage to serve all Garvin County Plants totals 25,000 bbl. The surface area required for plant and camp site totals 122 acres.



OIC Gate Valves installed in WORLD'S LARGEST GASOLINE PLANT located in Garvin County, Oklahoma.

0-549-7

OIC

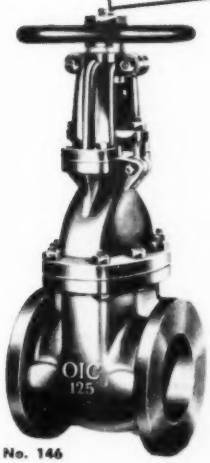
SETS THE PACE IN VALVES

FOR EVERY OIL COUNTRY USE

WARREN PETROLEUM CORPORATION in building and operating the WORLD'S LARGEST GASOLINE PLANT for The Texas Company, Carter Oil Company, J. E. Crosbie, Incorporated and Cities Service Oil Company and themselves elected to use OIC Valves because of their efficiency in flow control requirements. Reasons? Dozens!

Not the least, of course, is OIC's *long* line. It fills the petroleum field's needs for a wide variety of valves which function with absolute precision and safety for long periods of time. You're *safer* with OIC Valves, because materials for both trim and pressure-containing parts are selected for their utility in *all* the applications for which the valves are recommended. Special trims and combinations of trims for special applications are also available.

In addition, you get valve features such as leakproof joints to guard against pressure-drop . . . streamlined design to protect flow from turbulence . . . heavier construction to keep pressures and stresses in leash . . . wedges of heavy I-beam design for *positive* flow control . . . integral body ribs to effectively reduce vibration and wear. It's easy to see why, in "the oil country," OIC Sets the Pace in Valves!



No. 146

THE OIC CROSS REFERENCE CHART eliminates your valve replacement problems. Simply check the number of the valve on the line, turn to the OIC chart and find the correct replacement valve. Get your free copy from **The Ohio Injector Company, Wadsworth, Ohio.**

OIC VALVES

FORGED STEEL • CAST STEEL • IRON • BRONZE

Lindsay

Remote Compression-Absorption Station

...8,000-hp. units compress 36 million feet of gas to 760-lb. absorber; 720,000 gal. per day of rich oil moves to Maysville

THE Lindsay remote compression and absorption station was put into initial operation in March 1949. This station consists of ten 800-hp. vertical gas engines driving angle-type compressors having a total capacity of 36,000 M.c.f. daily. Nine of these gas-engine compressor units handle gas through three compression stages from 5-in. Hg vacuum to 760 psig. The compressor design volume is 27,000 M.c.f. daily. The tenth unit compresses 9,000 M.c.f. per day of separator gas from a portion of Lindsay field which is in excess of 200-psig. pressure at the separators. This latter compression is single stage from 200 to 760 psig.

The 30-tray 5-ft.-diameter absorber is designed for a maximum working pressure of 800 psig. Operating at 760 psig., it handles a gas volume of 40,000 M.c.f. daily. Enriched oil from the absorber flows by pipe line to the central Maysville plant for final processing. The residue gas from the Lindsay absorber is dehydrated in two 5-ft. 6-in. by 15-ft.-deep dry desiccant units (each in alternate service) for sale to a natural-gas pipe-line company. Fuel requirements for plant and lease uses are also supplied from the absorber residue stream.

Line run and meter house for the dry residue gas sold to Oklahoma Natural Gas Co. from the Lindsay compressor-absorber station

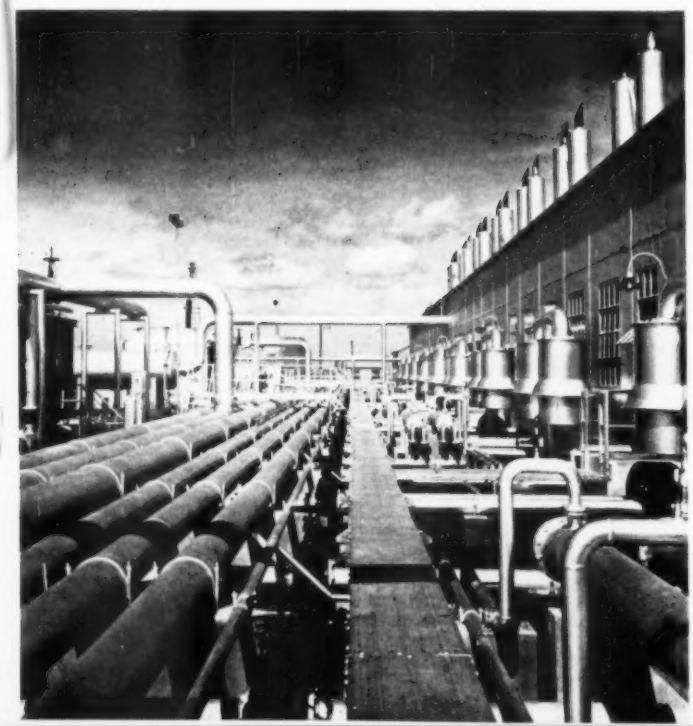
Electricity for the station is provided by three 190-kw. 480-volt, 3-phase, 60-cycle a.c. generators. These are driven by three V-type, four-cycle, six-cylinder gas engines rated at 275 hp. each. Synchronization of the three generating units and power distribution to various points of use are handled by a modern switchboard.

Cooling coils for the compressed gas are of the atmosphere water-flooded type. Water to the coils is cooled by a two-cell induced-draft cooling tower designed to handle 4,800 g.p.m. The heat-removal capacity is 29,000,000 B.t.u. per hour. Engine-jacket water is cooled by four radiator-type units having a total capacity of 7,200 g.p.m. The heat removal is 37,000,000 B.t.u. per hour in cooling the water from 150° to 140° F.

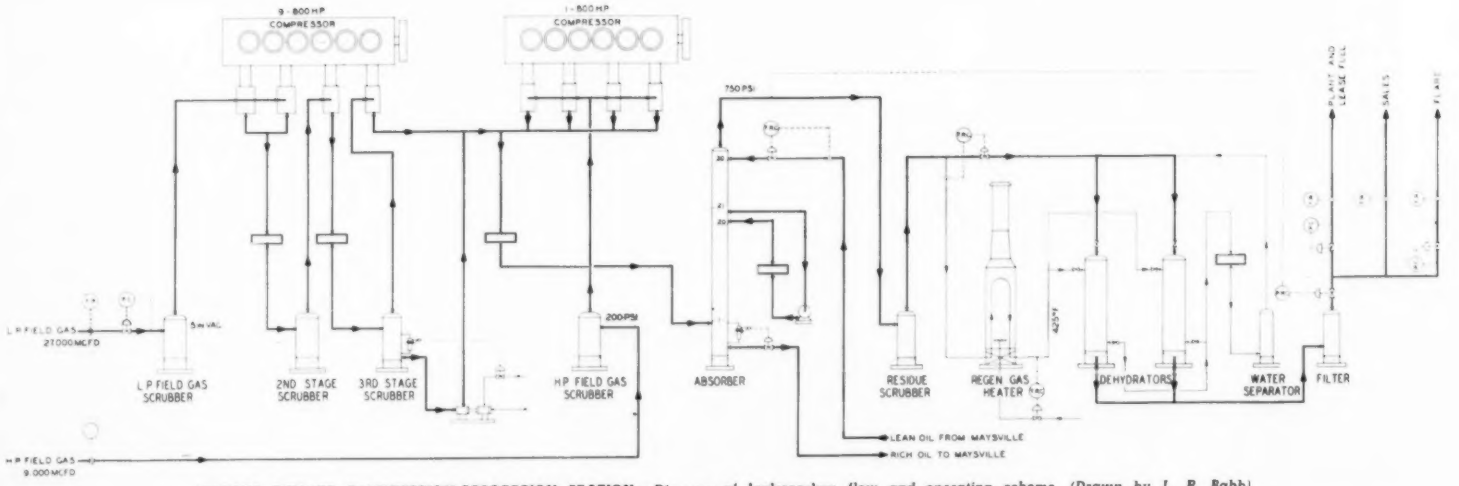
The gas-dehydrator units are regenerated with residue gas which is preheated in a direct-fired vertical furnace. Capacity rating of the furnace is 3,050,000 B.t.u. per hour.

During the period from March to July 1949, the Lindsay station deliv-

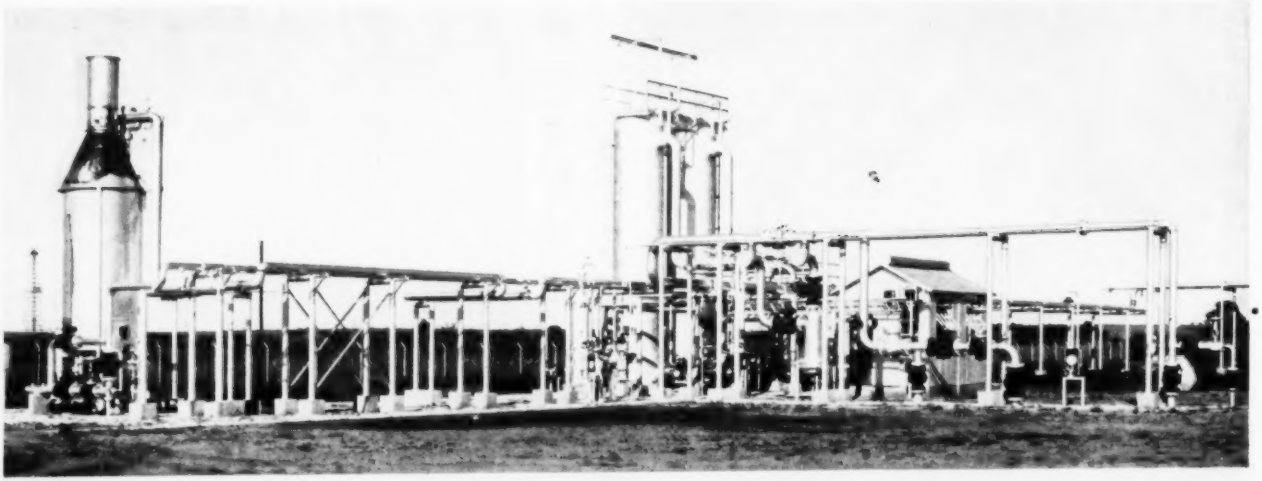
(Continued on page 110)



View of the "utility" side of the compressor station at the Lindsay plant. Shown on the sides of the steel walkway are the oil-bath air-intake filters, lubricating-oil coolers, and fuel and water pipe-line systems. Almost hidden in left background is one of the four radiator-fan type jacket-water coolers



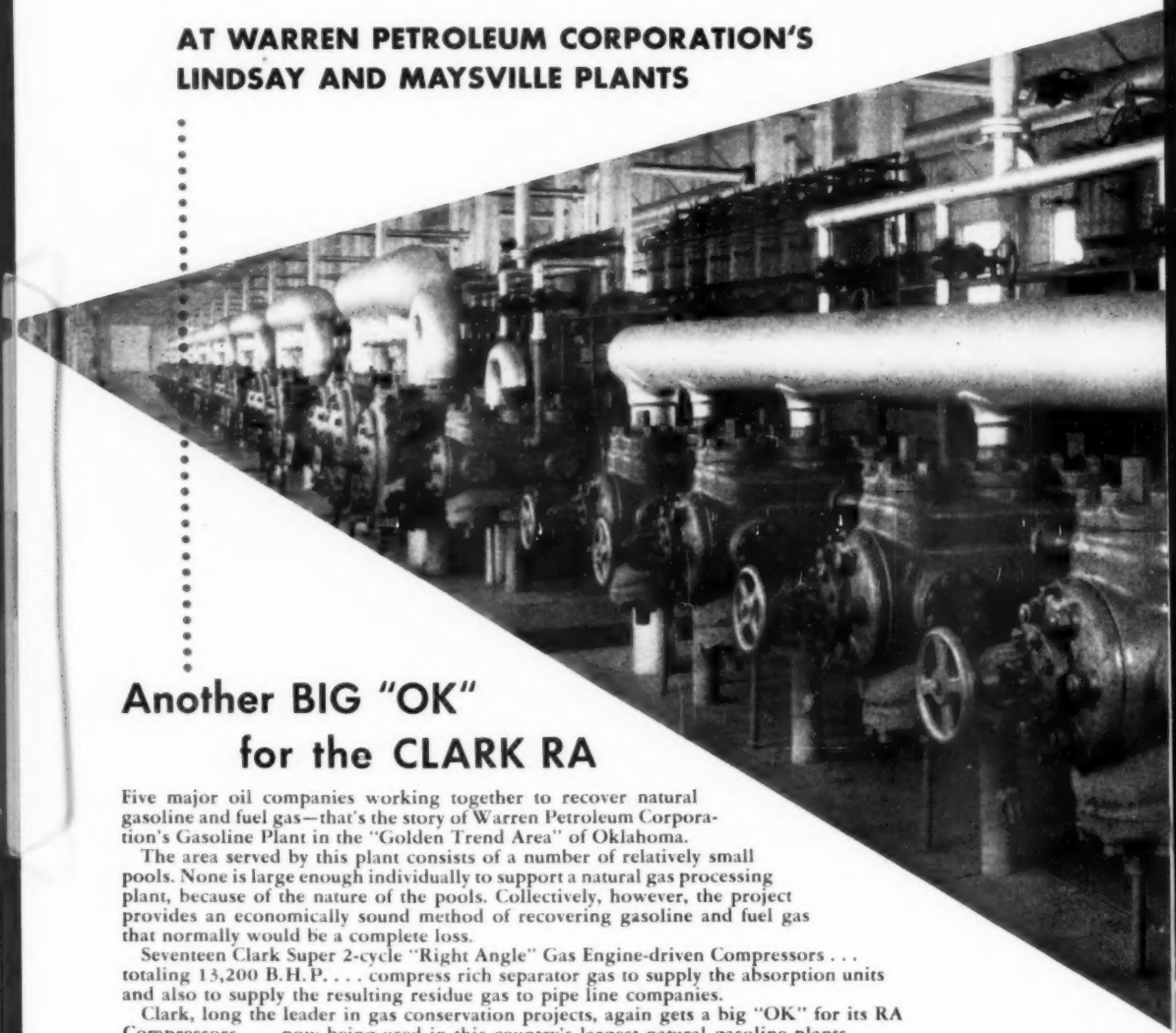
***LINDSAY REMOTE COMPRESSION-ABSORPTION STATION.**—Diagram of hydrocarbon flow and operating scheme. (Drawn by L. R. Babb)*



Gas dehydrating unit at Lindsay station where high-pressure gas (740 psi.) has water content removed down to dew point 20° F. below prevailing wet-bulb temperature, before sale to a gas company. The twin hydrators, used alternately, appear in center with control house and metering equipment at right. Activated alumina is used for desiccant. Vertical heater for raising gas to 425° F. for reactivating the dehydrators appears at left

13,200 INSTALLED HORSEPOWER

AT WARREN PETROLEUM CORPORATION'S LINDSAY AND MAYSVILLE PLANTS



Another BIG "OK" for the CLARK RA

Five major oil companies working together to recover natural gasoline and fuel gas—that's the story of Warren Petroleum Corporation's Gasoline Plant in the "Golden Trend Area" of Oklahoma.

The area served by this plant consists of a number of relatively small pools. None is large enough individually to support a natural gas processing plant, because of the nature of the pools. Collectively, however, the project provides an economically sound method of recovering gasoline and fuel gas that normally would be a complete loss.

Seventeen Clark Super 2-cycle "Right Angle" Gas Engine-driven Compressors . . . totaling 13,200 B.H.P. . . . compress rich separator gas to supply the absorption units and also to supply the resulting residue gas to pipe line companies.

Clark, long the leader in gas conservation projects, again gets a big "OK" for its RA Compressors . . . now being used in this country's largest natural gasoline plants.

Write for Literature—May we send you complete literature on other major natural gasoline plants? Clark Bros. Co., Inc., Olean, New York.

Owned jointly by: The Carter Oil Company • Warren Petroleum Corporation
The Texas Company • Cities Service Oil Co. • J. E. Crosbie, Inc.

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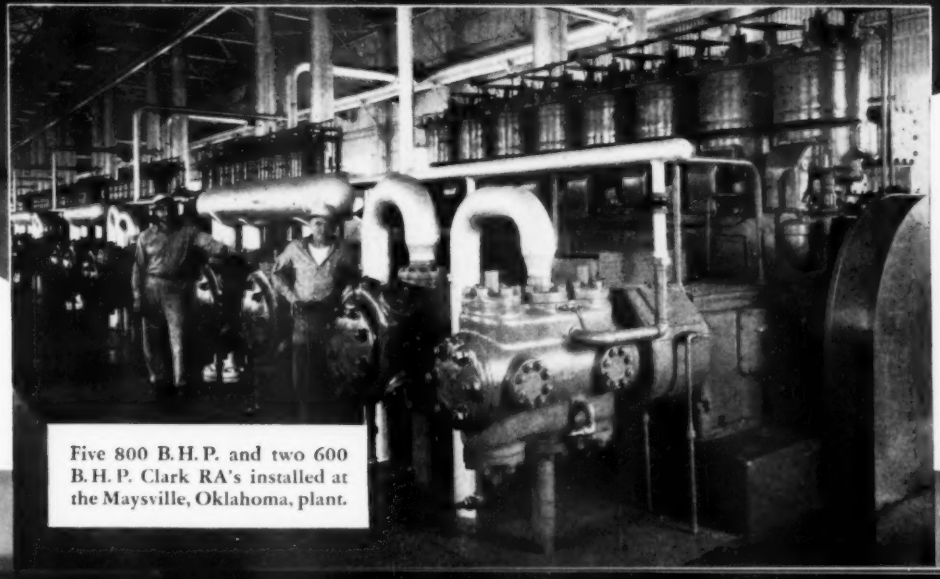
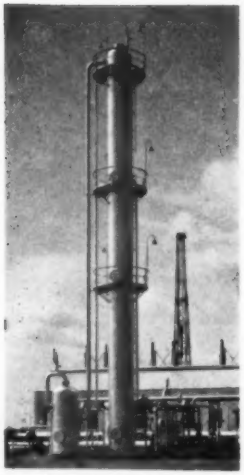
Ten 800 B.H.P. Clark Super 2-cycle RA Compressors installed at Warren Petroleum's Lindsay, Oklahoma, plant.

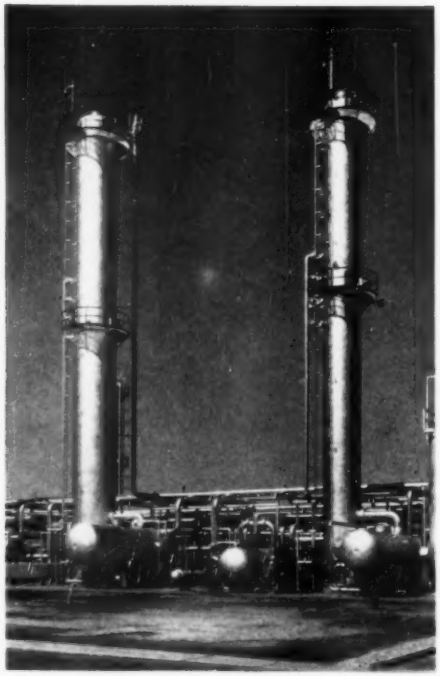


Five 800 B.H.P. and two 600 B.H.P. Clark RA's installed at the Maysville, Oklahoma, plant.

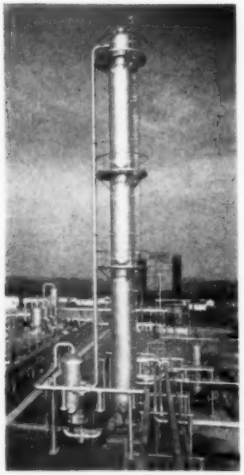
THE LATEST "WRINKLE" IN GASOLINE PLANT OPERATION



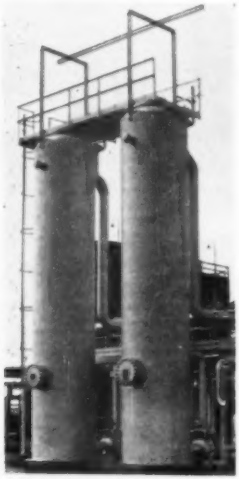
Above: Absorber Tower and a Residue Gas Scrubber at the Lindsay, Oklahoma, plant.



Left—A 6 ft. diam. by 80 ft. 6 in. high de-ethanizer. Right—A 8 ft. diam. by 90 ft. 6 in. high de-propanizer. Both are at Maysville, Okla. Commercial propane is taken from the de-propanizer overhead.



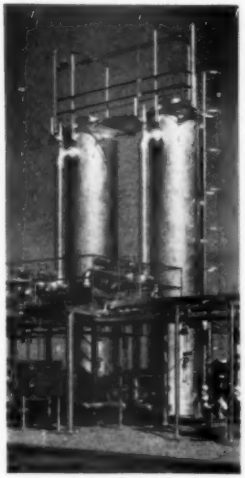
Above: Absorber Tower and a Residue Gas Scrubber at the Antioch, Oklahoma, plant.



Above: Dehydrator Chambers at Lindsay, Oklahoma, for dehydrating absorber residue gas.

Economical recovery from small pools made possible by operating three plants as a single integrated unit

The Warren Petroleum Corporation uses a novel method to put small pools at Antioch and Lindsay in Oklahoma on a sound economic basis. Enriched oil from plants there is piped to a nearby processing plant at Maysville which produces natural gasoline, butane, and propane. In addition to the equipment illustrated we furnished 39 pressure storage tanks, two dehydrator towers, one absorber tower and one raw gasoline surge tank. The same skill, the same facilities we used to build this equipment are available for you. Simply write our nearest office for details.



Above: Dehydrator Chambers for dehydrating total raw gasoline production at Maysville.

CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

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Chicago, 4 ..... 2128 McCormick Bldg.
Cleveland, 15 ..... 2204 Guildhall Bldg.
Detroit, 26 ..... 1514 Lafayette Bldg.
Havana ..... 402 Abreu Bldg.
Houston, 2 ..... 2119 National Standard Bldg.
Los Angeles, 14 ..... 1523 General Petroleum Bldg.
New York, 6 ..... 3347—165 Broadway Bldg.
Philadelphia, 3 ..... 1615—1700 Walnut Street Bldg.
Salt Lake City, 1 ..... 1525 First Security Bank Bldg.
San Francisco, 11 ..... 1254—22 Battery Street Bldg.
Seattle, 1 ..... 1325 Henry Bldg.
Tulsa, 3 ..... 1606 Hunt Bldg.

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Whessoe, Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela

Maysville

CENTRAL PROCESSING PLANT

. . . This large installation has a design capacity for the extraction and fractionation of products totaling 300,000 gal. per day

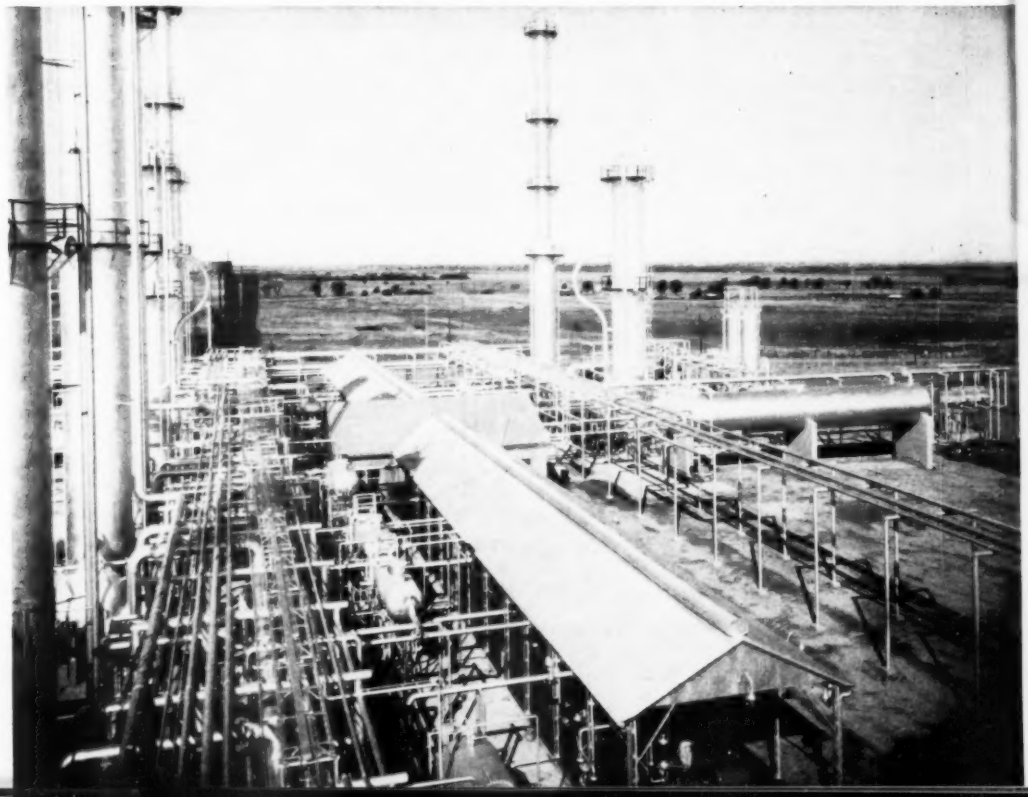
AT the central Maysville plant, the compressor and absorber units operate similarly to the Antioch and Lindsay remote stations. This plant also includes complete distillation, fractionation, storage, and loading facilities for gasoline and liquefied-petroleum-gas products recovered in the three absorbers.

For compression of wet gas from the producing fields nearest Maysville, there are two 600-hp. vertical gas engine - driven angle - type compressors which handle 4,500 M.c.f. per day of separator gas from 5-in. Hg. vacuum through three stages, to 760-psig. absorber pressure. Two 800-hp. units compress 9,000 M.c.f. daily of separator gas available at 30 psig., through two stages to the absorber. The 30-tray 4-ft. 6-in.-diameter absorber is designed to handle 30,000,000 standard cubic feet daily at 760 psig.

Rich oil from the Lindsay, Maysville, and Antioch absorbers is comingled and flashed in two 7 by 30-ft. surge tanks operated at 285 psig. The rich oil from the surge tanks is fed to the top of the stripping section of two parallel-operated rich-oil demethanizers, at 250 psig. and 80° to 90° F. Vent vapors from these surge tanks are fed to reabsorbing section of the rich-oil demethanizers at pressure and temperature conditions approximately the same as the rich-oil feed stream. The rich-oil demethanizers have the lower or stripping section of 7-ft. diameter with 20 trays; the upper or reabsorbing section is of 4-ft. 6-in.-diameter with 30 trays. Lean oil to the reabsorbing section is supplied directly from the second stage of the lean-oil pumps. One water-cooled intercooler is provided for each reabsorbing section.

Stripping heat for the rich-oil demethanizer units is supplied by exchanging hot lean oil from the still with rich oil from the base of the

Maysville plant, showing demethanizer, still and three fractionators at left and another demethanizer and still in center background. Horizontal vessel at right is the raw product make tank, with two residue gas dehydrators directly behind. The two long wings shelter process pumps, and the controlling-recording equipment for the plant is housed in the center portion



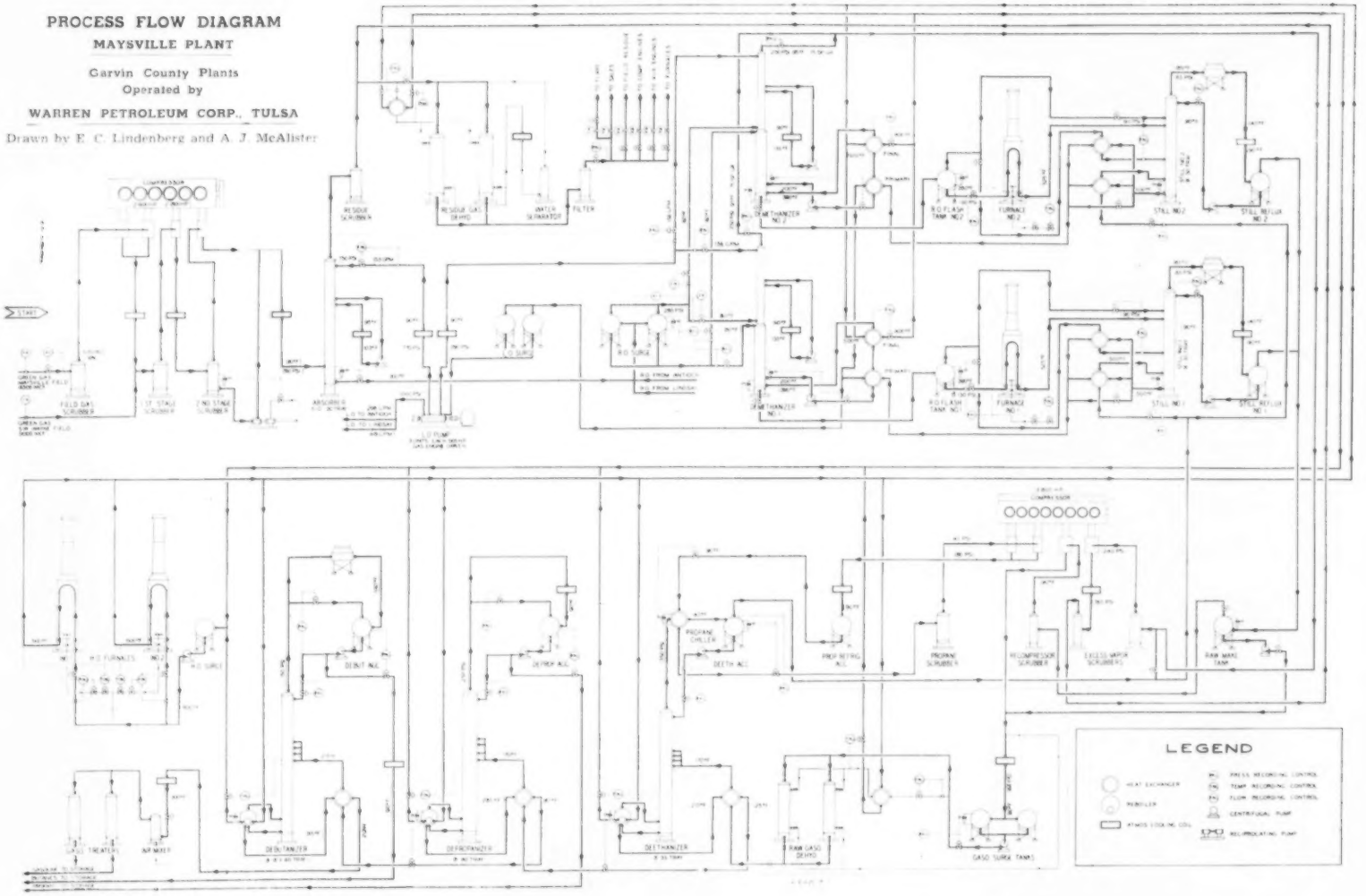
PROCESS FLOW DIAGRAM

MAYSVILLE PLANT

Garvin County Plants
Operated by

WARREN PETROLEUM CORP., TULSA

Drawn by E. C. Lindenberg and A. J. McAlister



1 **Integral Stellite Seats**—permanent, hard, corrosion and wear resistant.

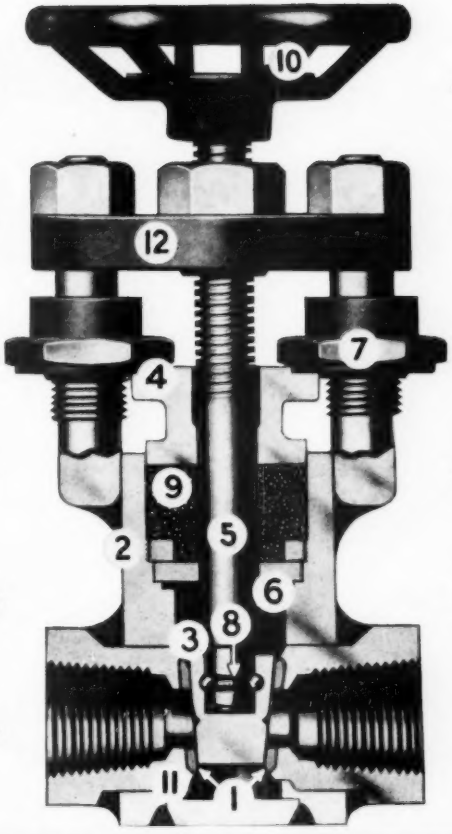
2 **No Bonnet Joint**—no leakage, no gasket trouble. Logging costs minimized.

3 **Dissimilar Materials In Seats and Wedges**—an extra guarantee of long-life, no galling.

4 **Self-Storing Gland**—no wiring or tieing in place. A "plus" for the operator.

5 **No Stem Pitting**—all stems completely coated with a heavy cadmium plating.

6 **Stainless-To-Stainless Back Seating**—allows stuffing box shut-off around stem when valve is fully opened.



7 **Gland Nut Threads Protected**—the length of the nuts is greater than their maximum travel.

8 **Ball Bearing Stem-To-Wedge Connection**—even distribution of load, easy operation, longer wear, less friction.

9 **Packing Ease**—plenty of packing space, packing of the highest quality, for the widest range of services.

10 **Safe, Comfortable Handwheel**—sleekly scolloped for easy, sure and comfortable grip.

11 **Interchangeable Parts**—all wedges, stems and thread bushings to exacting, absolute uniformity.

12 **Baked Enamel Exterior Finish**—complete protection from corrosion of all external parts.

TOUGH and TIGHT

They're known, in a large oil company, as "those tough and tight valves" . . . they combine twelve superiorities available in no other valve . . . they're modern in every detail even to the safe, comfortable, sleekly scolloped hand wheel. They're the *general purpose* Hancock Steel Gate WELDVALVES . . . Check them for yourself. You'll find that Hancock Gate WELDVALVES will take the toughest services, stay tight month-after-month . . . Costing no more than ordinary valves, Hancock Gate WELDVALVES give you integral stellite seats that mean years of trouble-free operation; a modern, functional design that eliminates bonnet leakage and gasket troubles, and ten other reasons why their usage is growing every day . . . Hancock Steel Gate WELDVALVES are designed for 800# at 750 deg. F. or 2000# at 100 deg. F. Sizes up to 2 inches.

Write today for the new Bulletin 202 on General Purpose Hancock Steel Gate WELDVALVES.

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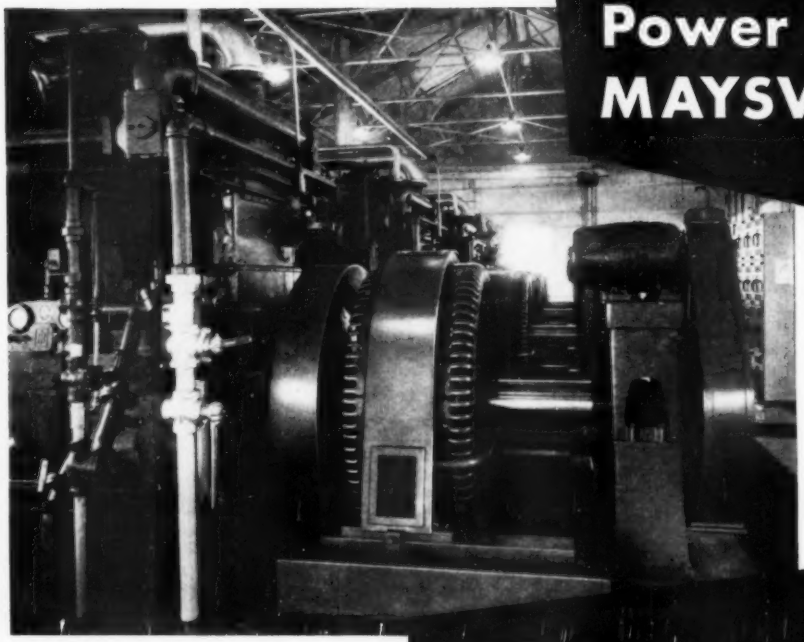


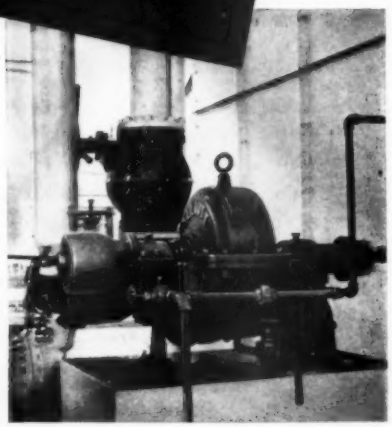
Power for MAYSVILLE

Elliott GENERATORS AND TURBINES

Four smooth-running Elliott generators, driven by Ingersoll-Rand gas engines, purr out the power for the Warren Petroleum Corporation Maysville plant. These generators are rated 500 kva, 400 kw, 327 rpm. Their 10 kw, 1750 rpm exciters are V-belt driven and mounted on the pedestal bearing.

The gas for driving these units comes in part from the exhaust of the Elliott mechanical drive turbine (shown at right) which drives a fan in the jacket water cooler. The turbine operates on process gas, at 200 psi, exhausting the gas at 40 psi to the engines and for use in firing the hot oil furnaces.

The selection of Elliott generators and turbine for this pace-setting gasoline plant, is just one more confirmation of the reputation for reliability which Elliott-built equipment enjoys throughout the petroleum industry.



Q-1145

ELLIOTT COMPANY

Electric Power Dept., RIDGWAY, PA.
Steam Turbine Dept., JEANNETTE, PA.

Plants at
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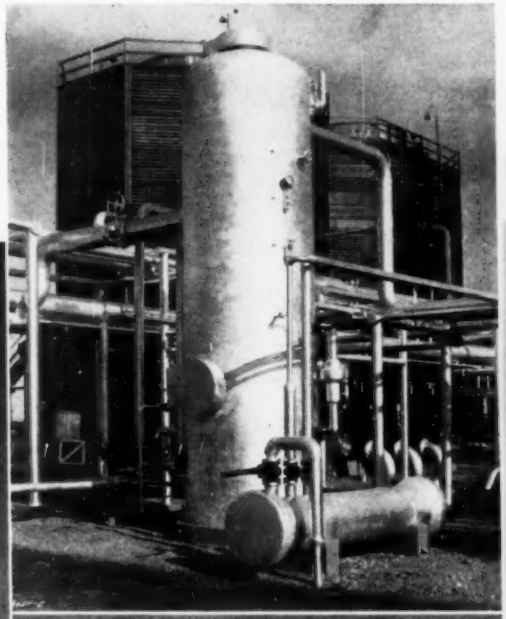
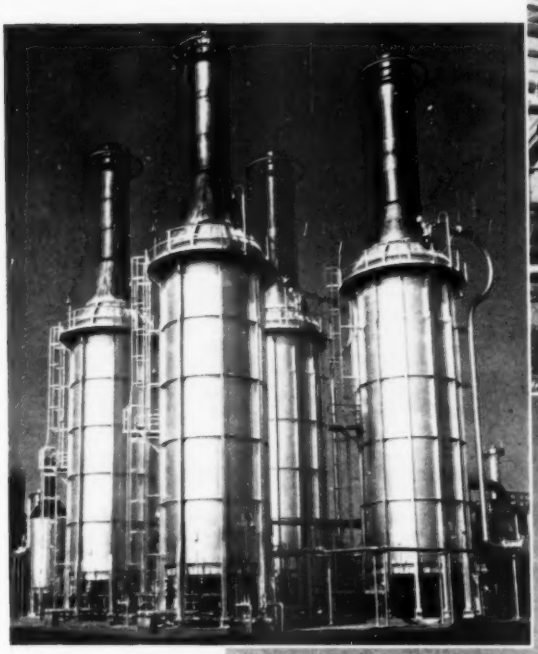
DISTRICT OFFICES IN PRINCIPAL CITIES

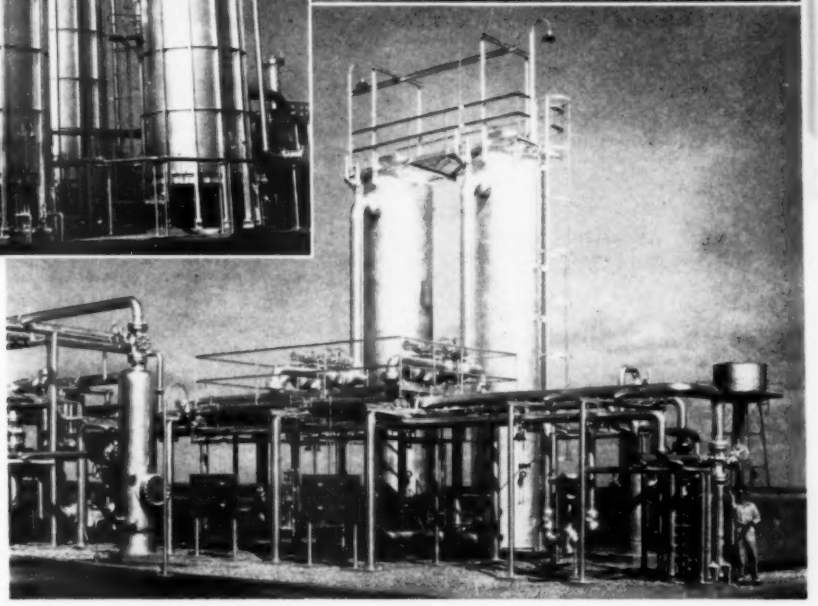
Equipment Features Maysville . . Heaters, Absorption Oil Purifier, and Gas Dehydrators

Absorption-oil stripping still for purification of contaminated oil. Same lean oil is used continuously. Its capacity is 60 g.p.m. It helps keep absorber capacity high by removal of foreign particles which in time plug up bubble cap slots, etc., if oil is not cleaned or purified

Below: Heaters at the Maysville plant. Of these four direct-fired vertical-tube heaters, among the largest ever placed in natural-gas processing-plant service, two heat the rich oil before it goes to the stills. Each of these two units has a heat delivery rating of 33,950,000 B.t.u. per hour. The other two units are on heating-oil service with each having a delivery rating of 41,500,000 B.t.u. per hour

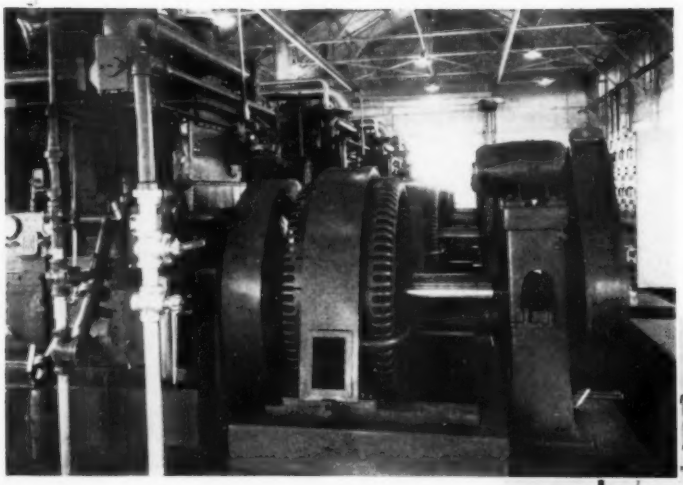




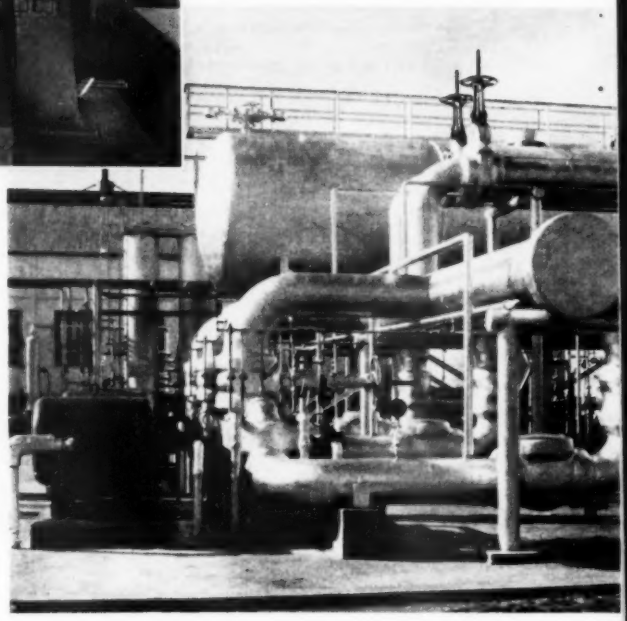


Right: Residue gas-dehydrator unit at Maysville plant. Gas is dehydrated to 20° F. below prevailing wet-bulb temperature, operating pressure usually is about 740 psi.

Generating Units, Heating Oil and Process Pumps, Gas Dehydrator Unit

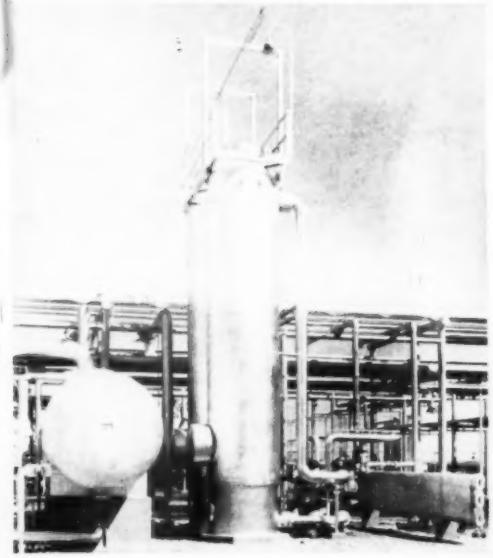


Above: General view of four 400-kw. generators and 600-hp. six-cylinder V-type four-cycle gas-engine drivers. Generators supply lighting, electric motor, and other power requirements for Maysville plant and camp

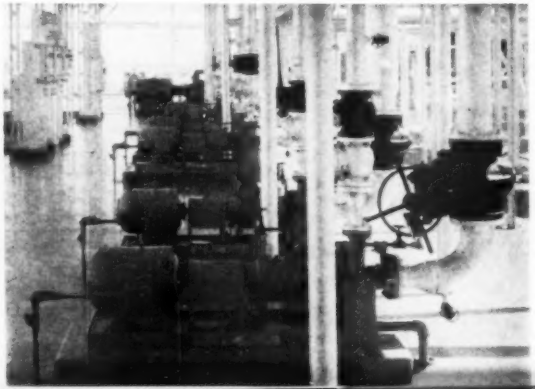


Above: Heating-oil circulation pumps (driven by electric motors) and surge tank. Piping, pumps, and tank are insulated. Instrument air dehydrators and generating building in the background

Below: Raw-products dehydration unit at Maysville central-processing plant. This employs a solid-type (activated alumina) desiccant. A side stream from deethanizer charge is vaporized in horizontal exchanger at right, for regeneration of desiccant



Below: Second wing of process pump section at Maysville plant. Electrical connections, piping, lighting are combined in over-all design to provide ease of access for maintenance and housekeeping



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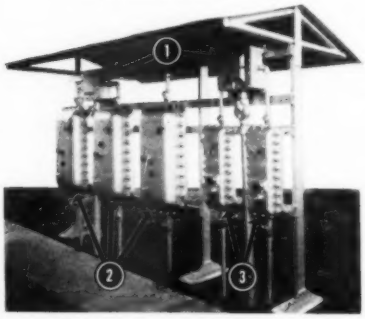
This is one testing room in the central laboratory building at the Maysville plant. At left, L. S. Briggs, gas tester, is running g.p.m. content on a sample of wet gas via N.G.A.A. charcoal adsorption equipment. Lab tester J. T. White at right is commencing an A.S.T.M. distillation test

NEW "SUPER" PLANT....



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"NEMCO" Explosion-Proof Two-Speed and Single-Speed Combination Motor Starters are much in evidence throughout the area occupied by the new-type natural gasoline plant which has recently been installed in Garvin County, Oklahoma.

Described as a "super" plant because it actually represents the combined operations of *three* natural gas processing units located at Antioch, Lindsay and Maysville, Oklahoma, this plant is handling a conservation job of enormous scope.

The above field photo shows but one of many groups of "NEMCO" Explosion-Proof products, including starters, air circuit breakers and junction boxes, which were furnished for this project; also a switchgear unit. You are invited to write for descriptive bulletins.

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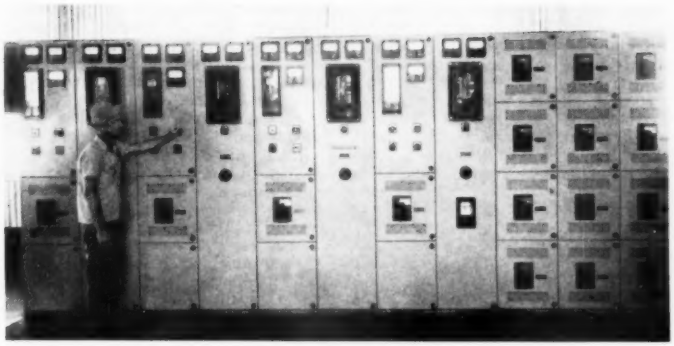
stripping section. Rich oil is then returned to the base of the demethanizer towers. Additional bottom tower heat is provided by a shell-and-tube unit heated by hot oil from the heating-oil furnaces. The tower-base temperature is controlled by flow of heating oil through the final heater.

Two Vertical Direct-Fired Rich-Oil Heaters

The level-controlled rich-oil stream from the base of the rich-oil demethanizers flows directly to the parallel-operated hot flash tanks. The rich oil from the hot flash is heated from 380° to 525° F. in parallel-operated rich-oil direct-fired vertical furnaces. The heated rich oil is fed to parallel-connected 30-tray 8-ft. diameter stills, at 90 psig. Vent hydrocarbon vapors from the hot flash tanks are preheated by hot lean oil from the still base from 380° to 500° F. and fed to the stills as primary stripping medium, several trays below the rich-oil feed. Final stripping of the oil in the stills is accomplished by preheating deethanizer overhead vapors to 500° F. and feeding to the stills below tray No. 1.

Primary condensing of still overhead vapors is accomplished in air coolers having a design heat-removal capacity of 7,180,000 B.t.u. per hour for each still. Final condensers are atmospheric-type water-flooded coils located in the induced-draft cooling tower. Design capacity for these units is 9,040,000 B.t.u. per hour for each still.

Vent vapors from the raw-product make tank which is operated at 75 psig., are compressed and coil blended with the liquid hydrocarbon stream from this tank. The stream is then delivered to two large parallel-operated raw-product surge tanks. The large surge-tank capacity provides a



Electric-generator switch panel serving the four 400-kw. generators. Operation of two or more generators is synchronized by modern control instruments

deethanizer feed stream of relatively constant composition and quantity.

All of the unstabilized production is dehydrated in solid-desiccant-type units. The dehydration design is such that refrigeration of the deethanizer overhead stream is accomplished without freezing up. The commercial propane produced from the depropanizer overhead does not require further dehydration.

Final fractionation is carried out in the conventional stepwise cycle. The deethanizer vent vapors are used for final oil stripping in the stills. The base product from the deethanizer is fed to the depropanizer which produces commercial propane overhead. Butane and heavier are taken from the base and fed to the debutanizer to produce butanes as an overhead product and natural gasoline from the base. The debutanizer operating conditions are determined by the vapor-pressure natural gasoline required.

One unusual feature of the debutanizer operation is that the reflux is condensed by air cooling. The net butane product to storage is finally cooled by water over atmospheric coils located in the induced-draft cooling tower.

Reboiler heat for all fractionators is supplied by the hot-oil stream circulated continuously through the two heating-oil furnaces. The natural gasoline from the base of the debutanizer is cooled in atmospheric coils and treated to provide a salable final product. The hot-oil system is used instead of a steam-boiler installation and no boiler-feed makeup or treating is required.

Design of the Garvin County Plants was framed on gas composition as follows:

Component—	Mol %
Methane	73.79
Ethane	12.76
Propane	7.68
I-butane	.68
N-Butane	2.92
I-pentane	.50
N-pentane and heavier	1.67
	100.00

Large Quantity of Mineral Seal Oil

Approximately 520,000 gal. (65 tank cars) of mineral seal oil were required to fill the circulating system and absorbers in the three interconnected units, together with the heating-oil system and spare storage at Maysville. There are three eight-stage centrifugal pumps driven by 505-hp. gas engines at Maysville for circulation service for all lean-oil requirements for the Garvin County Plants. One unit serves as standby

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for the two operating units. The unusual feature of these pumps is that three separate pressure and quantity requirements are provided by the same pump. Discharge from the second stage supplies oil to the rich-oil demethanizing towers. Another discharge stream from the sixth stage provides lean oil to the Maysville primary absorber. The final or eighth stage discharges stream at 1,000 psig. by pipe line to the Antioch and Lindsay absorbers.

Absorption Oil Reclaimer Unit

A special furnace, stripping tower, air-cooled condenser, and accumulator installation provides a facility to purify up to 5 per cent by volume (60 g.p.m.) of the total lean oil circulated. A side stream is piped from the main lean-oil system through a direct-fired furnace supplying heat to the stripping tower. The desirable portion of the reclaimer feed stream is condensed by air cooler and returned to the lean-oil surge tanks. The waste material discharged from the base of the stripping tower is piped to the burn pit. By this cleaning process the lean oil stream is maintained sufficiently free of heavy ends of oil and other undesirable materials to provide constant absorber efficiency. Where no oil-cleaning provision is made, the bubble-cap slots often become clogged, thus decreasing the gas-to-oil contact efficiency.

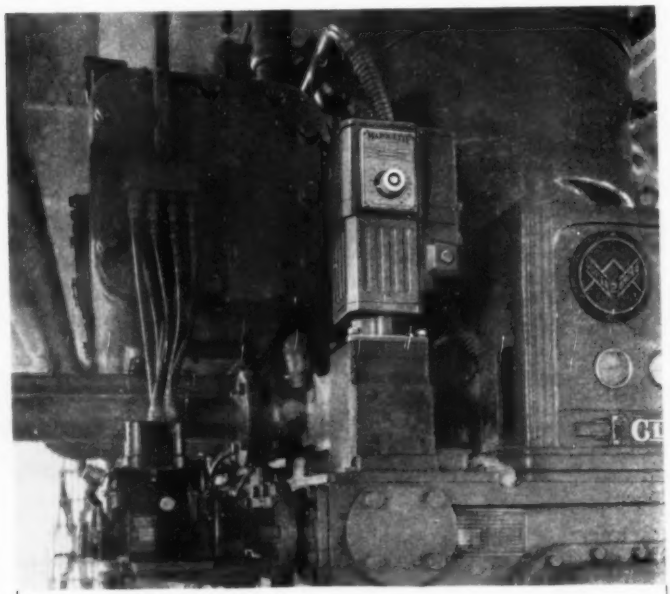
Three 800-hp. gas-engine-driven compressor units provide three special plant compressor services at Maysville. A portion of the compressor capacity serves as a conventional recompressor for hydrocarbon vapors from the raw product make tank. This stream is coil blended with the liquid from the same tank and discharged to the deethanizer feed surge tanks. A second service of the compressor capacity is to compress propane vapors for refrigeration in the deethanizer overhead vapor condenser to produce a cold reflux stream. The third service is to compress any excess vapors above furnace and other plant utility fuel requirements to residue gas sales pressure. This excess gas is commingled and dehydrated with the primary stripped gas from the absorber at approximately 750 psig.

The central Maysville plant also has a large electric-generating station. The equipment consists of four 400-kw., 480-volt, 3-phase, 60-cycle generators. Each generator is driven by a 600-hp., 4-cycle, angle-type gas engine. A large panel board and auxiliary equipment provide for synchronizing of the four generating units and for power distribution to the points of use within the plant area, laboratory, offices, etc.

Product Storage and Loading Facilities

Pressure storage tanks having a total capacity of 1,900,000 gal. serve for temporary storage of various vapor-pressure natural gasolines, butane, and propane at Maysville. Electrically driven centrifugal pumps can deliver the three products simultaneously to a 36-unit tank-car loading rack located approximately 2 miles from the plant area. Tank-truck loading facilities are located outside the fence adjacent to the storage tanks. Electrically driven plunger-type pipeline pumps deliver natural gasoline to two pipe-line companies at specified times.

A majority of the personnel employed in operating the Garvin County Plants has a wealth of experience background in operating and maintaining all of the types of oil and gas-industry equipment and pipe-line systems in service at this location. The supervisory personnel has had broad experience in previous operations. As a result of having such experienced personnel, the initial starting of all units was carried on in an efficient manner.



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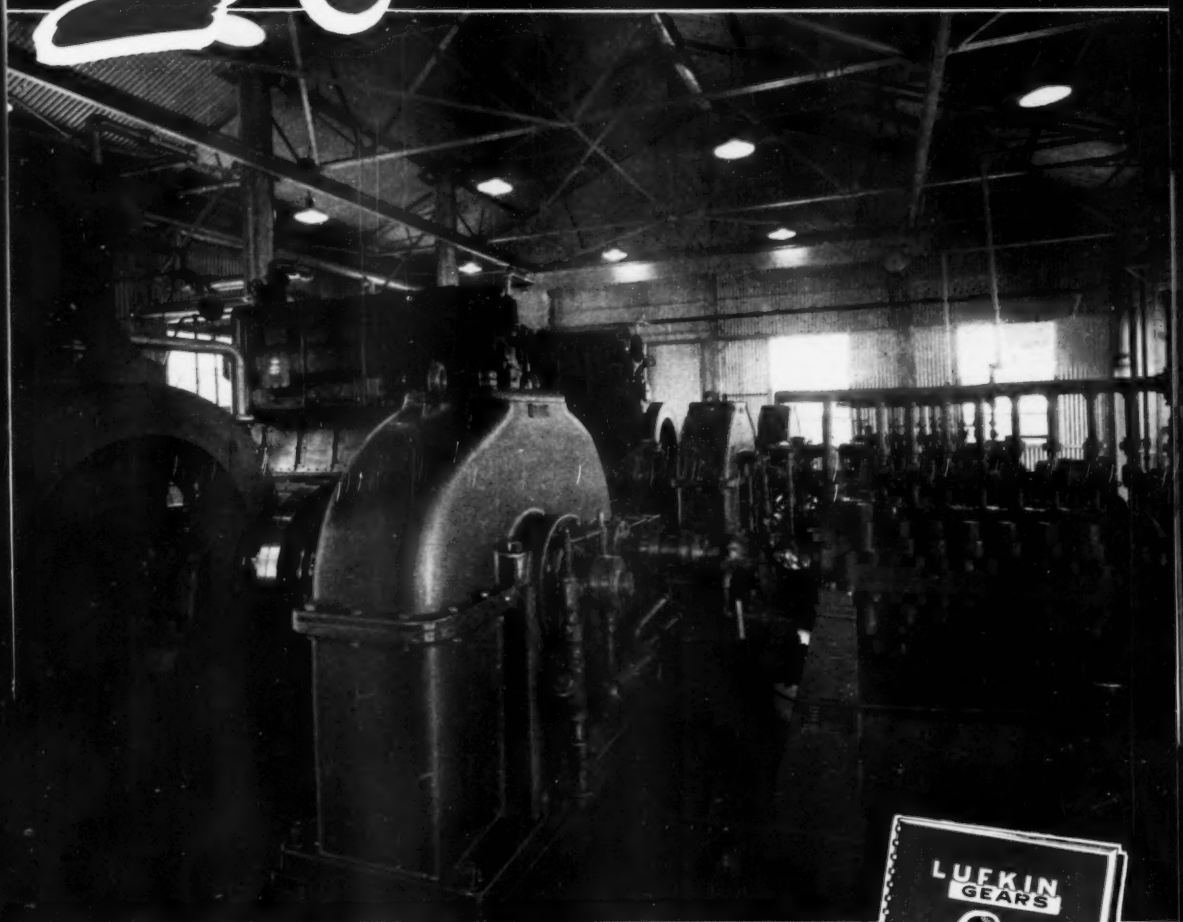
REMAINING ARTICLES IN SECTION

Antioch Compression-Absorption-Repressuring Plant—page 102
Water Supply—page 104
"Repressure" Service at Antioch Plant—page 106

Lufkin AT WORK at MAYSVILLE



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Antioch

Remote Compression - Absorption - Repressuring

. . . 8,400-hp. units compress 31 million feet to remote absorber; 2,000 hp. compress to 2,400 psi. for repressuring

THE Antioch station began initial operation in July 1948. This unit consists of a battery of 13 gas-engine-driven angle-type compressors requiring a total installed horsepower of 8,400. These units compress field separator gas from 5-in. Hg. vacuum through three stages to 760-psig. absorber pressure. The design volume for these units is 31,000 M.c.f. daily.

The remote absorber at Antioch, designed for 800-lb. maximum working pressure and 40,000,000 standard cubic feet daily capacity, is supplied with lean or stripped oil by pipe line from the central Maysville plant. Enriched absorption oil flows under absorber pressure from the base of the Antioch absorber by return pipe line to the central plant for commingling with other rich-oil streams and final processing.

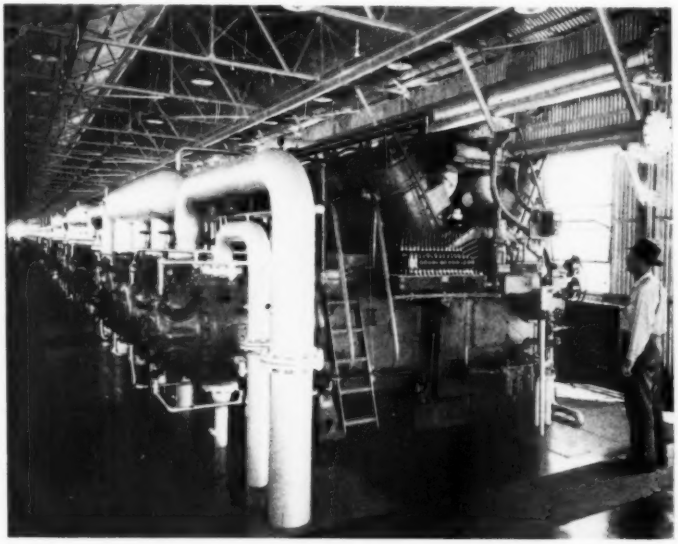
Residue-gas outlets from the Antioch absorber are connected to plant and lease fuel, gas sales, and repressure systems. The residue gas is dehydrated in a solid-desiccant-type dehydration unit designed for a daily capacity of 30,000,000 standard cubic feet. The repressure gas stream, having a dew point as low as minus 40° F., is compressed from 740 to 2,400 psig. for gas-injection service to the Southwest Antioch Gibson Sand Unit. These compressors are driven by three gas engines totaling 2,000 hp.

The utilities for this plant are provided by modern equipment. Electrical requirements are supplied by five 100-kw., 600-r.p.m., 460-volt, 3-phase, 60-cycle, a.c. generators driven by 175-hp., 5-cylinder, 4-cycle, vertical-type gas engines.

Interstage gas cooling is provided by atmospheric - type water - flooded cooling coils, for which the water is cooled in induced-draft towers designed for 6,000-g.p.m. water capacity and removal of 45,000,000 B.t.u. per hour. Engine-jacket water cooling is provided by four radiator-type coolers designed to handle a total of 7,200 g.p.m. and remove 37,000,000 B.t.u. per hour. Dehydrator regeneration gas preheating is performed by a direct-fired vertical furnace designed for 3,050,000 B.t.u. per hour.

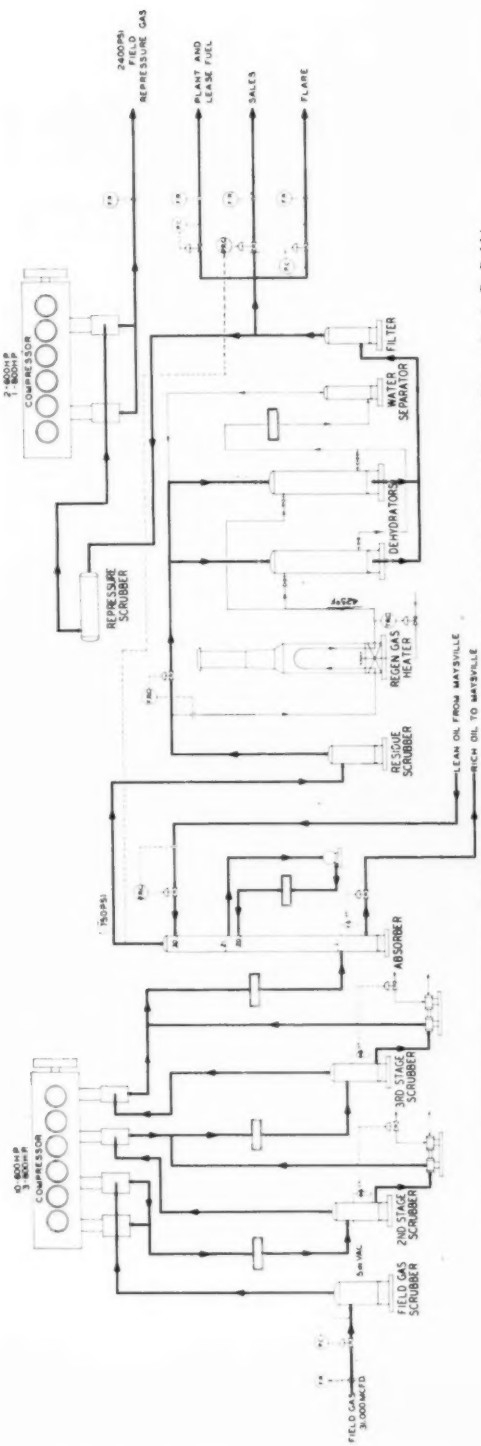
In addition to the major conservation program for the completed Garvin County Plants, the interim period from July 1948 to July 1949 saw the Antioch station produce some 30,000 gal. daily of compression gasoline. The raw product was fractionated to produce commercial butane and natural gasoline in two fractionating columns installed for this temporary service. The temporary equipment has been removed since Garvin County Plants began full operation.

(See flow diagram on opposite page)



Right: Shown here are the 16 gas compressors at Antioch, totaling 10,400 hp. The 13 units in foreground perform gathering and compressing service on the gas from the field. At the far end of station are three compressor units which boost stripped gas from the absorber to 2,400 psi. for return to the Gibson sand for repressuring service

Below: Over-all view of Antioch compressor-absorber-repressuring plant. Design capacity for this unit is 31,000,000 standard cubic feet per day of incoming gas

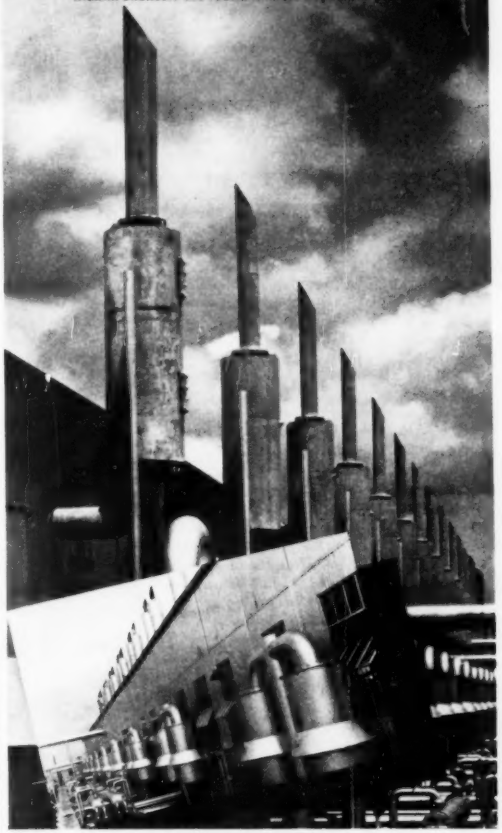


ANTIOCH COMPRESSION-REPRESSURE STATION.—Diagram of Hydrocarbon flow and operating scheme. (Drawn by L. R. Babb)

MAXIM IS PART OF THIS IMPORTANT PICTURE

in Oklahoma

The Maxim exhaust silencers shown here provide quiet operation of 26 gas compressors totaling 18,400 H. P. Top picture at Antioch, bottom at Lindsey, Oklahoma; both plants engineered and constructed by Drasco Engineering Company of Tulsa for Warren Petroleum Corporation and associates . . . just another proof that Maxim Silencers are found in most important plants



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MAXIM

Water-Supply System

Pipe Lines Provide for 10,000 Bbl. Daily of Water to Serve Three Plants

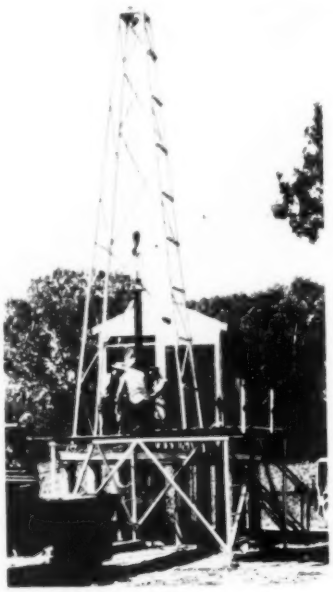
AN adequate water supply was a problem of major concern during preliminary consideration for such a large plant installation. Early tests indicated the red-bed sands were too near the surface in the immediate plant area, and a widespread area was searched for a suitable location for supply wells. The preliminary survey indicated the red-bed strata dipped downward to the south. This led to investigating water sand southward some 17 miles from Maysville, where good subsurface water supplies were located.

Four water wells were completed within a 1-mile radius to supply all water requirements for the Garvin County Plants. The wells are 500 ft. deep and are pumped by multistage deep-well centrifugal pumps powered by gas engines. The water production is delivered into two 2,000-bbl. storage tanks. From storage, a two-stage gas-engine-driven centrifugal pump capable of handling 300 g.p.m. of water by 6, 8, and 10-in. pipe line to all Garvin County Plants.

During the search for an adequate water supply the temptation frequently arose to depend on the nearby Washita River as a source of water supply. However, this source would not have been adequate for the heavy summer-time requirements of 10,000 bbl. or more daily unless a substantial-sized reservoir were constructed. A suitable reservoir would amount to such sums that the drilling and operating of water wells would become competitive. A second major drawback to the river-water supply would have been the heavy treating requirements and resulting cost. Unfortunately, for all the disadvantages of the river as a water source, major obstacles also arose from the presence of this stream. The major concern has been to span the river with pipe-line bridges to insure continuous operation during flood seasons.

Two suspension-type pipe-line bridges, approximately 300 ft. in length, were required. One bridge 2 miles northeast of Maysville supports a 16-in. gas-gathering line and a 6-in. residue-gas line. Another suspension span southeast of the Lindsay station supports four pipe lines including a 20-in. gas-gathering, a 6-in. residue-gas, a 6-in. lean-oil, and a 6-in. rich-oil line.

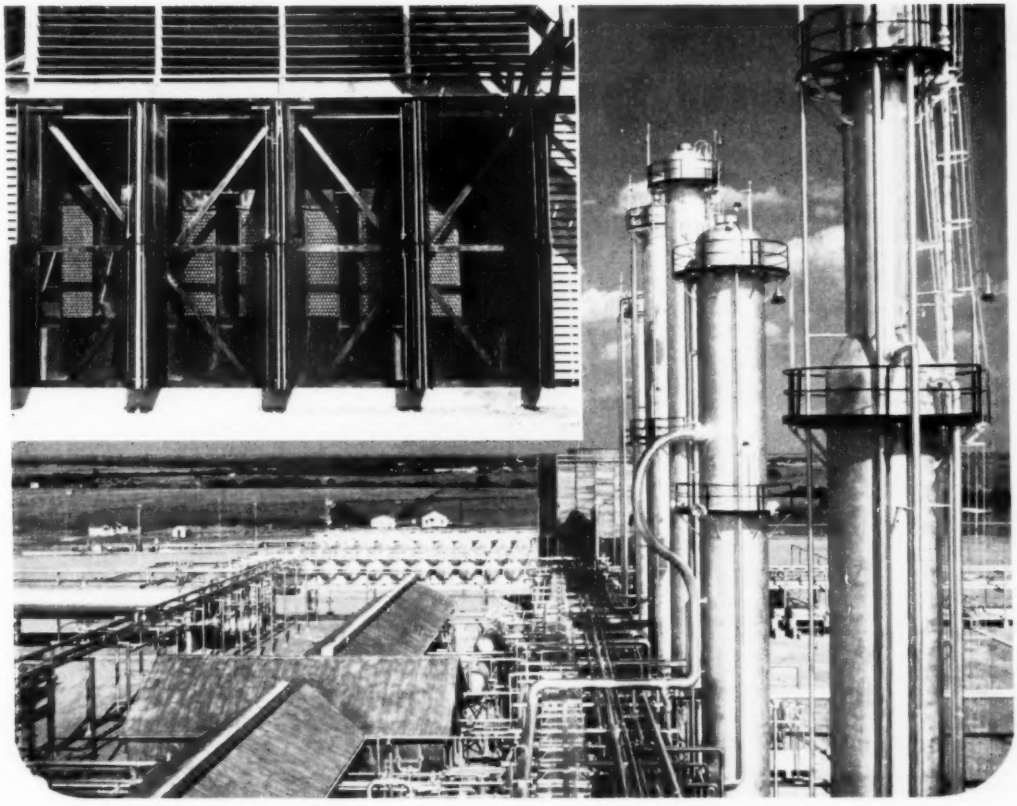
Dresser Engineering Co., Tulsa, was the engineering and construction contractor for the Garvin County Plants. Contractors for the field pipe-line installations were Holland Construction Co., Tulsa, and Pipe Line Service Co., Seminole, Okla.



Right: An adequate water supply is one of the features of the Garvin County Plants. Four water wells were drilled in an extensive aquafier 11 miles south of the Antioch station. Each of the four wells is equipped with a large-capacity submersible centrifugal pump driven at the surface by a 40-hp. gas engine, through a gear box. A steel derrick is provided at each well to facilitate pump inspection and maintenance. The mast and engine house are elevated on steel substructure to prevent inundation of the surface equipment by occasional flood waters

Left: Interior view of water pump station serving the new gas-processing installation. Shown is one of the two two-stage centrifugal pumps driven by a 120-hp. gas engine. Right: Water pump station for the Garvin County Plants. Building at right houses two centrifugal pumps, each driven by a 120-hp. gas engine. The two 2,000 bbl. bolted steel tanks at left are for receiving and settling water from the supply wells

WESTERN'S VERTICAL SECTIONS



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Western Vertical atmospheric exchangers are available in surfaces ranging from 300 sq. ft. to 2500 sq. ft.

See Western's sections in the current issues of Refinery Catalog, Chemical Engineering Catalog, and Thomas Register.

San Francisco Representative: Trident Engineering Company

Antioch Plant Provides "Repressure" Service To Gibson Sand Unitized Operation

. . . up to 25 million cubic feet daily injected to reservoir, to increase ultimate oil recovery

by Kenneth B. Barnes
Engineering Editor

A RAPIDLY growing phase of natural - gasoline - plant operations is the association or service of gasoline plants in connection with the repressuring and pressure-maintenance programs for the oil fields which supply wet gas to the plants.

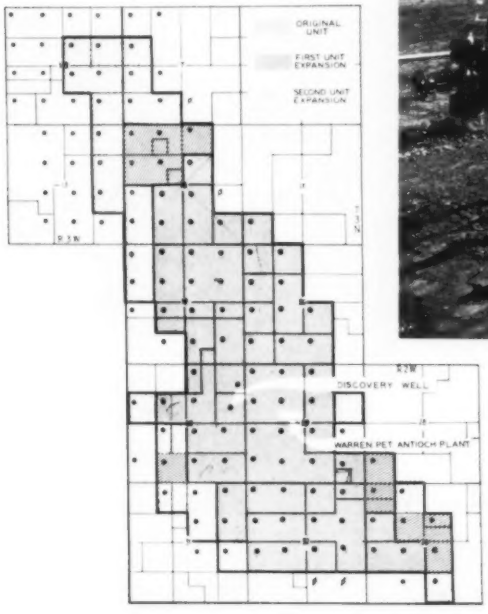
Today there are many of these repressuring-pressure maintenance programs interlocking with gasoline-plant operations. They are located in the eastern fields, in the Mid-Continent area, in Gulf Coast and Southwestern producing operations, and in the Rocky Mountain and California areas.

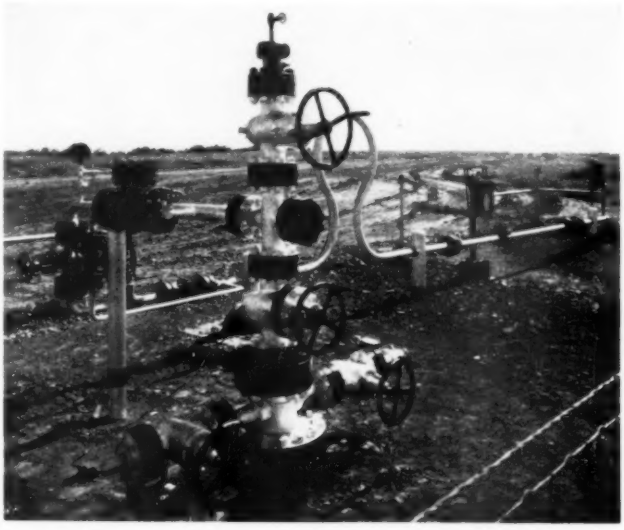
Quite often the gasoline plant-repressuring activities are performed on a contractural basis as far as the gasoline-plant operation and compression service (for gas injection) is concerned. The "Southwest Antioch Gibson Sand Unit" is a large project of this kind, which receives compression service from the Antioch station of the Garvin County Plants, which has been described in the series of articles in this editorial section.

The Antioch station has two 600-hp. and one 800-hp. compressor units installed to provide the compression service for the Southwest Antioch Gibson Sand Unit operation. These compressor units, for providing the "repressure" gas to the unit operators, boosts the stripped gas from the 740-psi. absorber level to 2,400 psig. The gas is dehydrated and has a dew point as low as minus 40° F. Compressor capacity for the repressure service is 25,000,000 standard cubic feet per day.

The Antioch unitization and repressuring operation is performing quite satisfactorily. The October allowable oil runs were approximately 10,000 bbl. per day, and approximately 8½ million barrels of crude oil have been produced from the unit.

The original Antioch injection program began operation under the direction of Globe Oil & Refining Co., April 1, 1948. Since that time the unit lease area has undergone two expansions. From the initial unit of 67 wells, it grew to 80 by September 1, 1948, and again expanded in October 1949 by an addition of 23 wells to make a total of 103. Most of the growth has been in a northwesterly direction from the original unit, and several more wells have been drilled in this territory and may be included in the unit program at some future date. Some of these wells are being tested now to meet regulations for possible entrance into the unit. An accompanying map shows the addi-





Left: Map of Southwest Antioch Gibson Sand Unit, showing expansions of area which have been made. Above: Typical input well, Antioch area

tions to the original unit and wells outside the unit which may sometime become part of it.

Southwest Antioch pool is on the southwest flank of the Pauls Valley uplift, and is located in west central Garvin County. Production is from a stratigraphic trap in the Gibson sand, found at depths ranging from 6,250 to 6,700 ft. in the field. The structure is monoclinal, dipping west and southwest. The trap is formed by the intersection of the Gibson, a lower Pennsylvanian sand, with a southwest-dipping unconformity at the base of the Pennsylvanian system. Dry holes have been drilled on the fringes of the field in the south and east.

A per well spacing of 40 acres throughout the field—a total unit area of 4,120 acres. Approximate reservoir characteristics include an average sand thickness of 30 ft., an average porosity of 16 per cent, and a connate-water content of 15 per cent. Original bottom-hole pressure in the field was 2,925 psi., and initial gas-oil ratio was 1,165 cu. ft. per barrel. October 1949 allowable for the unit was 310,930 bbl.

Participation in the unit was determined for each 40-acre tract by a percentage factor, based on the acre-feet of productive sand and a productivity factor figured from the individual well production. Each of these bases contributes one-half of the percentage factor. The percentage factor has been applied to the unit allowable to determine well allowable.

PARTICIPANTS IN SOUTHWEST ANTIOCH SAND UNIT AND REPRESSURING OPERATION

Company—	Interest, per cent
Anderson-Prichard Oil Co.	6.924
Devonian Oil Co.	3.944
Globe Oil & Refining Co.	21.767
Gulf Oil Corp.	2.239
Magnolia Petroleum Co.	5.125
Mid-Continent Petroleum Corp.	3.835
Phillips Petroleum Co.	7.614
Sinclair Oil & Gas Co.	14.429
Skelly Oil Co.	4.157
Sunray Oil Corp.	6.204
Vickers Petroleum Co.	16.867
Others	6.895

Original oil in place recoverable by gas expansion was estimated by engineers to be about 12,000,000 bbl. for the 67-well unit. Total recoverable oil with gas injection has been estimated at about 23,000,000 bbl. for the original unit. For this area there has been an estimate of original oil in place of 50,000,000 bbl.

The Antioch plant picks up field gas at trap pressures of 0 to 5 psi., boosts and strips it of gasoline and L.P.G. with 760-psi. absorber pressure.

The unit operation was initiated without interference or objection from royalty owners. This ease resulted from the complete and thorough educational program instituted by operators early in unitization plans. It was the third unit operation to begin under the regulations of Oklahoma's House Bill 339.

A specific and comprehensive program was followed in the matter of keeping the royalty interests informed. This program was started immediately after the operators in the field had conducted preliminary engineering studies and determined that benefits could be derived from a gas-injection project in the pool. This study showed that nearly twice as much oil could be recovered by gas injection as would be recovered by primary recovery methods. It also was found that to inject gas properly it would be necessary to unitize. The operators' first step was to name a committee which would fully inform the royalty owners of the situation.

One of the first steps taken was the formation of an operator's committee which, in a meeting with royalty owners, suggested that the royalty owners organize. As a result of this meeting, the Southwest Antioch Royalty Owners Association was formed. This group was governed by the following by-laws:

Membership: Any owner of royalty

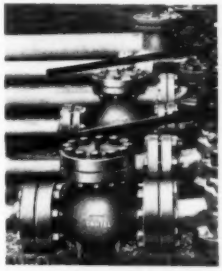
DANIEL ORIFICE FITTINGS

Chosen for Accuracy—Dependability

ON THE 26" and 30" TEXAS-CALIFORNIA GAS TRANSMISSION LINES

Years of performance records for accuracy, dependability, service, trouble-free operation and ease of maintenance are only a few of the reasons DANIEL ORIFICE FITTINGS were selected exclusively for these installations.

Illustration on the right shows a DANIEL 30", 600 lb. A.S.A. (1000 lbs. C.W.P.) fitting being installed in the field for main line measurement. This is the largest high pressure Orifice Fitting ever manufactured. Made of alloy steel, it has a stainless steel orifice plate one-half inch thick. Total weight—9750 lbs.



Consult Composite Catalog for sizes, prices, etc., or write for your copy.

The DANIEL Engineering Department is available to help you in your measurement problem.

DANIEL PISTON CONTROLLED CHECK VALVES

Conforms to and in many cases exceeds the 1949 revised A.S.A. Standards. They are designed for high pressure service where pulsations are severe. Cushioning action of the piston eliminates pounding and chattering. Available in sizes from 1 to 16 inches. Pressure range to 2500 A.S.A.

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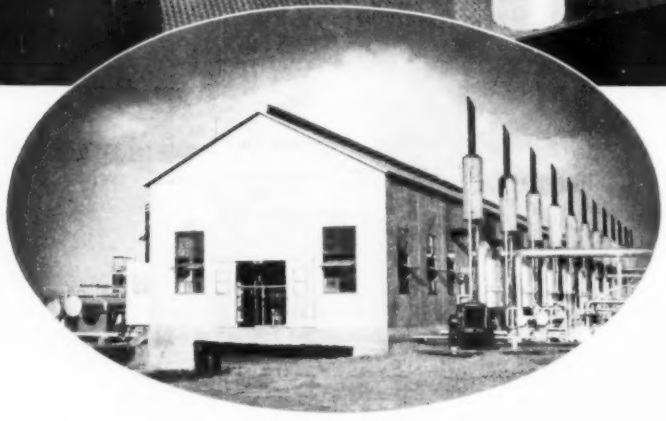


ABOVE: Line-up of modern Cooper-Bessemer 600 hp GMV compressors in Warren Petroleum's Antioch plant. Of 12 units shown, 10 are for gasoline work, 2 for pressure maintenance service. In addition, plant contains 4 GMV's of 8 cylinder, 800 hp size.

LEFT: Warren Petroleum's compressor building at Antioch, Oklahoma, housing 16 V-angle GMV units totaling 10,400 Cooper-Bessemer compressor horsepower at this location.

Compressors • Pumps • Engines

New York Washington Bradford, Pa. Parkersburg, W. Va. San Francisco, Cal. Seattle, Wash.

LEADERS GET TOGETHER . . .

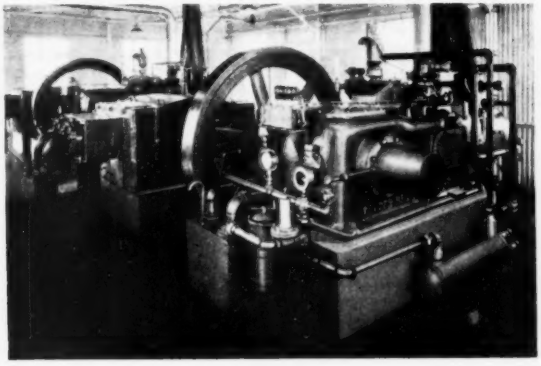
FOR ULTRA-MODERN, HIGHLY EFFICIENT OPERATION

WARREN Petroleum Corporation, a pioneer in gasoline extraction, has been recognized year after year as a leader in the natural gasoline industry. Recent plant expansions and processing advancements, aimed at greater propane recovery, contribute to the company's truly enormous field processing operation and help assure continued leadership.

The modern compressors, engines and pumps shown on these pages are part of Warren Petroleum's most recently added facilities. They are now serving in various phases of the company's gasoline work and pressure maintenance. All are Cooper-Bessemer units, built by a company likewise recognized as a leader in its field . . . *for over a century!*

When planning your power, compressing and pumping needs, be sure to check with Cooper-Bessemer on the new features, new developments that continue to uphold this kind of leadership.

At Warren Petroleum's Maysville plant, these 3 Cooper-Bessemer JS-6 gas engines (505 hp at 450 rpm) drive lean oil pumps; give the continuous low-cost, trouble-free service for which these Cooper-Bessemers are noted.



This installation, at Warren Petroleum's Holliday plant, marks first use of Cooper-Bessemer Twin-Line pumps in gasoline work. Despite surprisingly small space, each of these 4 cylinder pumps, driven by Cooper-Bessemer 150 hp GAW gas engines, will handle up to 14,500 bbl. of lean oil a day at 800 psi.

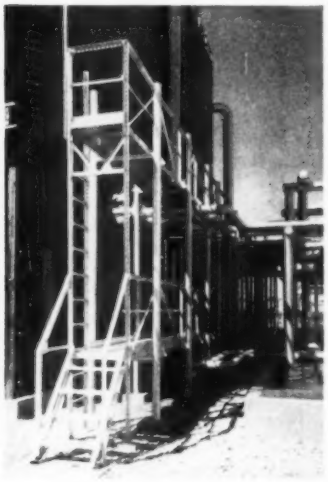
by **Cooper-Bessemer**

MOUNT VERNON, OHIO AND GROVE CITY, PENNA.

Houston, Dallas, Greggton, Pampa and Odessa, Texas Tulsa Shreveport St. Louis Los Angeles

under a tract within the developed area of the field, or under a tract offsetting a developed tract or tract on which drilling operations are in progress shall be eligible.

Purpose: To provide a means whereby owners of royalty in the field may jointly consider and act on problems of mutual interest and, in particular, with owners of working interests in the field any proposals for more efficient oil and gas production practices.



View of lower and upper catwalks giving convenient access to inlet and outlet piping headers and valves for process cooling tower

Voting: Each owner shall have one vote for each 5 acres ownership of royalty or mineral interest or fraction thereof. A majority vote of the eligible voters attending any meeting shall be required to carry any question.

Organization: The association shall elect from its membership a chairman, a vice chairman, and a secretary-treasurer and shall elect five of its members—all as members of the board of directors.

Financing: There shall be no regular assessment for dues, except for such assessment as each at a duly called meeting voluntarily subscribe.

The royalty owners' and operator's committees have worked together to obtain cooperation and to operate the unit to their mutual advantage.

Lindsay

(Continued from page 86)

ered a raw gasoline (compression product) by pipe line—the present oil line—to the temporary stabilizing units at the Antioch station, for production of butane and natural gasoline.

An item of considerable magnitude for this station is the large-diameter pipe lines required in the low-pressure gas-gathering system. Approximately 10 miles of 20, 24, 26, and 30-in.-diameter pipe is included in the extensive wet-gas collection system.

In addition to the large-diameter pipe lines in the low-pressure gathering system at Lindsay, a second feature of the gathering system is the requirement of a high-pressure gas-collecting system to deliver 12 million cubic feet of gas daily to the single-stage compressor unit. This single-stage compressor operates at approximately 200 psig. intake pressure. The high-pressure gas production is from the Simpson formation and the low-pressure gas is produced from the Pennsylvanian sand and Hunton lime.

During the rainy seasons soil in the Lindsay area becomes highly water saturated for some depth. Therefore, it was necessary to provide extensive pipe-line anchorage to prevent the buoyancy force from lifting such large-diameter pipe line out of the ground. Special designed anchors were installed approximately every 80 ft. along the large-diameter lines. These were buried 10 ft. below pipeline depth.

In WARREN PETROLEUM CORPORATION'S FIELD PROCESSING PLANT at ANTIOCH

FIVE BRUCE-MACBETH TYPE G-5 GAS ENGINES rated at 175 HP at 600 R.P.M. driving generators in electric power plant at Warren Petroleum Corporation's ultra modern field processing plant at Antioch, Okla.

Bruce-Macbeth Gas Engines generate energy at a cost below many other kinds of power; they operate efficiently on gas ranging in heat value from 125 to 3000 b.t.u. per cubic foot; their speed can be synchronized easily with generating equipment or other machinery.

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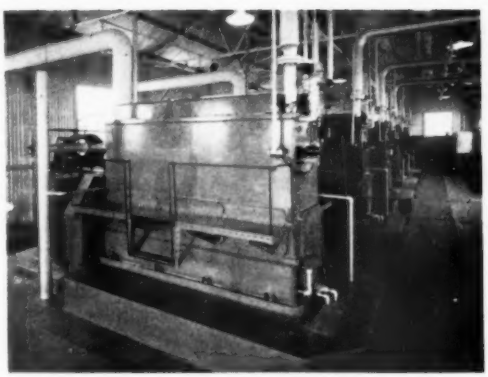

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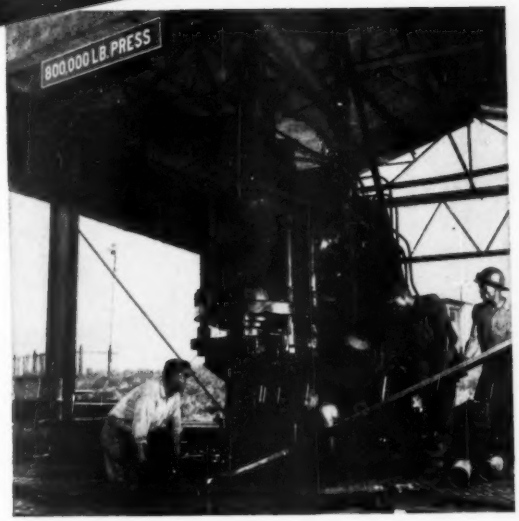
has the tools...



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You, IN THE OIL INDUSTRY, know the importance of the right tools for the right job! It is the same with marine repairs—the right tools for the job can save more time and more money. Take, for instance the 800,000 lb. press shown above. . . . AVONDALE'S other special tools include rollers, plate brakers, lathes and many others. These, plus AVONDALE'S 24-hour machine shop service, can save YOU money on all types of marine repairs—no matter how large or how small. Call AVONDALE, consult our experts—get our estimate on your job.

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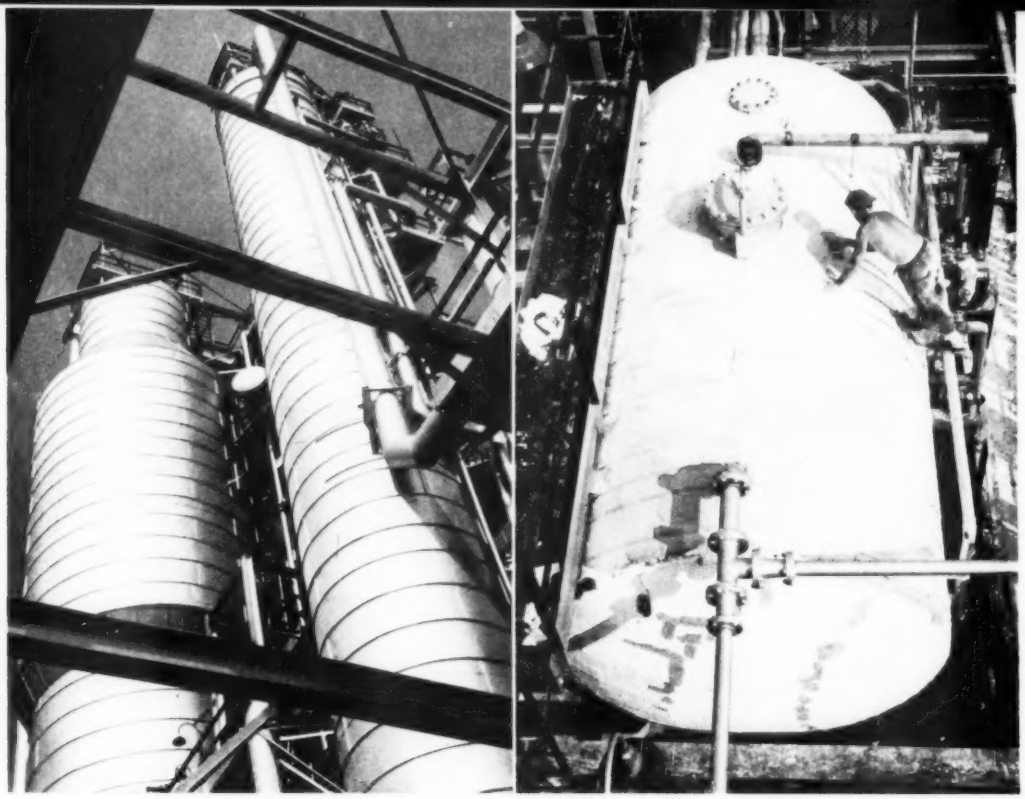

Left: The vacuum tower, left, and stripper, right, in the new lube-oil plant at Socony's Paulsboro refinery. Both of these vessels are insulated 85 per cent magnesia and diatomaceous silica. Right: This photograph of a horizontal vessel in the new plant shows the final step in preparing the insulation prior to installing metal jacketing. Insulation on this vessel is cement-coated 85 per cent magnesia

INSULATION *of Socony-Vacuum's* NEW LUBE-OIL INSTALLATION

AS part of a general expansion and modernization program at the Paulsboro, N. J., refinery of Socony-Vacuum Oil Co., Inc., new lubricating-oil facilities have recently been put into operation. The project consists of a vacuum distillation unit, a furfural lube-oil refining unit, a propane-deasphalting unit, and a solvent-dewaxing unit. The installation was designed for flexibility of operation and to function automatically wherever possible. The refinery is rated at 60,000 bbl. per operating day and produces a wide variety of lube oils.

Because optimum temperature control is of prime importance in lube-oil production, to aid in obtaining it the design and installation of the insulation were given special care and planning. Among the problems involved were the rather rigorous climate, characteristic of the northeastern part of the country, irregular shape of some of the larger pieces of equipment, such as the vacuum tower, and variation in operating temperature in different parts of the same unit.

In addition to temperature control, insulation was provided for the protection of personnel, so that they could operate and service equipment conveniently without danger from exposed hot surfaces.

On high-temperature lines and equipment, insulating materials used were 85 per cent magnesia and diatomaceous silica, applied either singly or in combination, depending upon the temperature involved. The combination is used to take advantage of the low heat conductivity of the magnesia and the resistance to the effects of high temperatures of the diatomaceous silica. Both are molded insulations, made in the form of semi-cylindrical and segmental pipe sections and curved and flat block. In crushed form, they are used to make insulating cements. The molded forms can easily be cut to fit the requirements of a specific surface.

Thickness of insulation used are listed in the accompanying table. Among the factors considered in specifying these thicknesses were functions of the insulation, i.e., protection or temperature control, location of equipment, operating temperature, cost of heat production, etc.

Materials and methods of apply-

ing and finishing the insulation were chosen so that a minimum of maintenance would be required regardless of the extreme operating conditions to which the insulation might be subjected.

Insulation of Piping

Semicylindrical or segmental sections applied to piping were butted tightly together with joints staggered and wired in place with 18-gage stainless-steel wire. To obtain a tight, permanent fit, six wires were used per 3-ft. section. On bends and fittings of lines 3 in. in diameter or larger, the insulation was cut to fit and fastened in place with at least one wire per piece. On lines 2½ in. in diameter and less, these parts were insulated with cement built up to the proper thickness. Flanges of all sizes were insulated with pipe insulation, cut to fit. Screwed valves were insulated with cement.

The type of finish used varied with the location of the piping and the operating conditions to which it would be subjected.

Insulation on piping located outdoors was finished with 24-gage galvanized sheet-metal jacket with 2½-in. circumferential and longitudinal laps. The jacket was fixed in place with ½-in. stainless-steel straps and clincher seals, the straps being placed 9 in. apart. Bend, fitting, valve, and flange insulation was finished with a smooth layer of cement, over which were applied two coats of asphaltic-asbestos plastic, each ¼ in. thick. The plastic was extended for 1 in. under the metal jacket on the adjacent pipe insulation, as a precaution against moisture and leakage.

Indoors, pipe insulation requiring protection from mechanical abuse was also finished with metal jacketing. If subject to moisture, oils, fumes, alkalines or acid, the insulation was finished with a coating of asphaltic-asbestos plastic. Other indoor pipe insulation was jacketed with 40-lb. rosin paper, over which a layer of 8-oz. canvas was pasted. On bends, fittings, valves, and flanges, the insulation finish consisted of a smooth layer of cement, a jacket of 40-lb. rosin paper, and finally an 8-oz. pasted canvas jacket.

Equipment Insulation

Basically the methods used for insulating and finishing vertical equipment and horizontal equipment over 30 in. in diameter were the same. Blocks were applied with the long dimension held vertically on vertical equipment and horizontally on horizontal equipment, butted tightly together with joints staggered, and held in place with 1-in. stainless-steel straps and clincher seals. All joints were sealed with asbestos cement. The straps were placed 1 in. each side of the butt joints on the outer insulation layer, and 18 in. apart on

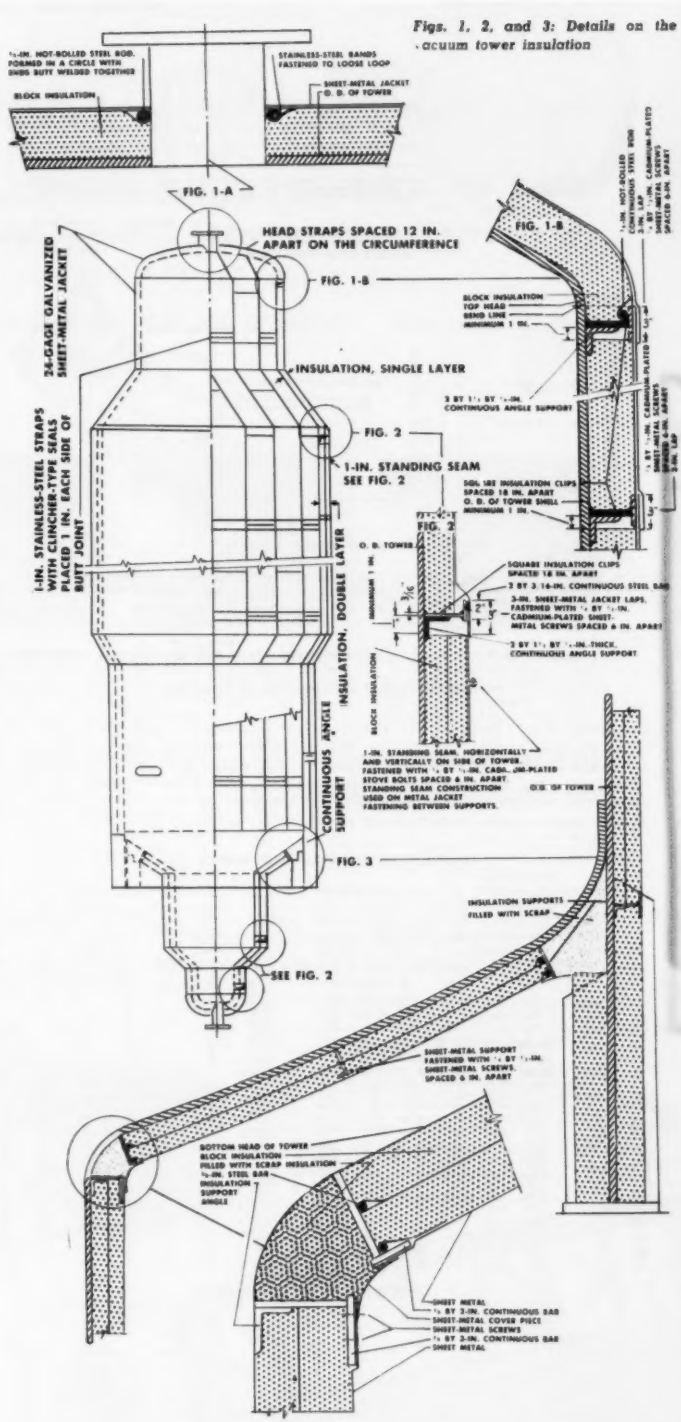
FIG. 1-A
HEAD STRAPS SPACED 12 IN. APART ON THE CIRCUMFERENCE
FIG. 1-B
24-GAGE GALVANIZED SHEET-METAL JACKET
INSULATION, SINGLE LAYER
FIG. 2
1-IN. STANDING SEAM SEE FIG. 2
½-IN. STAINLESS-STEEL STRAPS WITH CLINCHER-TYPE SEALS PLACED 1 IN. EACH SIDE OF BUTT JOINT
INSULATION, DOUBLE LAYER
CONTINUOUS ANGLE SUPPORT
FIG. 3
SEE FIG. 2
INSULATION SUPPORTS FILLED WITH SCRAP

Figs. 1, 2, and 3: Details on the vacuum tower insulation

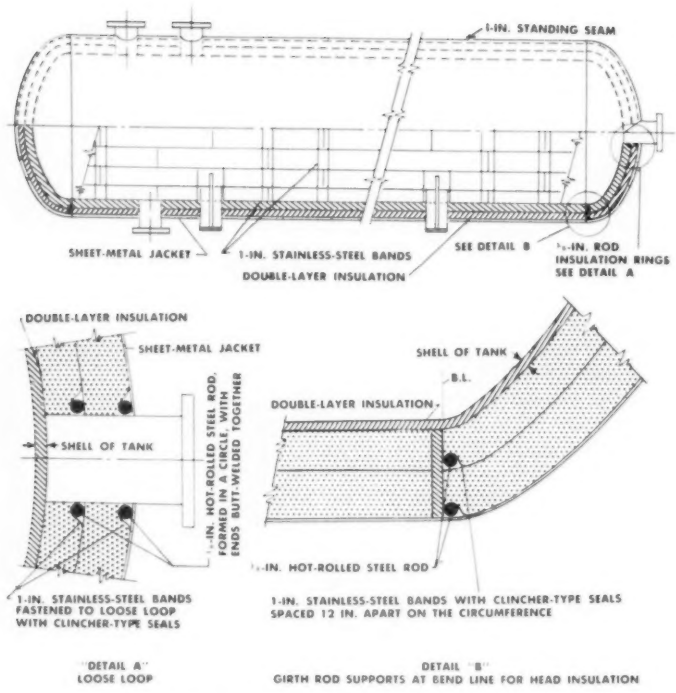
1-IN. STANDING SEAM
SHEET-METAL JACKET
1-IN. STAINLESS-STEEL BANDS
DOUBLE-LAYER INSULATION
SEE DETAIL B
½-IN. ROD INSULATION RINGS SEE DETAIL A
DOUBLE-LAYER INSULATION
SHEET-METAL JACKET
SHELL OF TANK
½-IN. HOT-ROLLED STEEL ROD, FORMED IN A CIRCLE, WITH ENDS BUTT-WELDED TOGETHER
1-IN. STAINLESS-STEEL BANDS FASTENED TO LOOSE LOOP WITH CLINCHER-TYPE SEALS
"DETAIL A" LOOSE LOOP
SHELL OF TANK
B.L.
DOUBLE-LAYER INSULATION
½-IN. HOT-ROLLED STEEL ROD
1-IN. STAINLESS-STEEL BANDS WITH CLINCHER-TYPE SEALS SPACED 12 IN. APART ON THE CIRCUMFERENCE
DETAIL "B" GIRTH ROD SUPPORTS AT BEND LINE FOR HEAD INSULATION

Fig. 4: Typical horizontal vessel insulation

the inner layer. Support for the insulation and anchor points for the tie-straps were provided by means of angles, clips, bars, rods, etc., welded to the surface of the equipment. Nozzle necks were insulated in the same manner, and with the same thickness as used for the piping.

All equipment insulation was finished with a metal jacket similar to that used on the outdoor piping. The metal jacket was lapped over for 3 in. at each insulation support point, and fastened in place by means of cadmium-plated sheet metal screws. Sections of the jacket were joined together by a 1-in. standing seam, closed by a cadmium-plated stove bolt.

Details as to the method of insulation support and fastening and applying the metal jacket vary from one piece of equipment to another because of size, shape, type of service, etc., and are shown in the accompanying illustrations.

Insulation of horizontal tanks larger than 30 in. in diameter is shown in the accompanying figures. Tubulars in this size group were insulated in the same way, except that the flanged end sections were left bare. The insulation ends abutting the uninsulated area were sealed with cement and made weather-resistant with asphaltic-asbestos plastic. Reboilers over 30 in. in diameter were insulated like the tanks and, in contrast with the tubulars, the flanged ends were also blocked in, void spaces around the flanges being packed with scrap insulation.

In the case of the ammonium hydroxide surge and mix tank, only the top 60 per cent of the tank was insulated. To form a drip, the sheet metal jacket was extended below the insulation by 1 in.

Horizontal equipment under 30 in. in diameter was insulated with sectional and segmental pipe insulation applied in the same way as on piping.

G-F in heat exchangers were insulated with a combination of pipe and block insulation, the pipe sections or segments being used on the top and bottom of the equipment, with the blocks fitted between them on the sides. To serve as a foundation for the insulation, 1-in., 19-gage galvanized hexagonal wire mesh was first wrapped around the equipment. The metal jacket finish was applied in two sections.

This new plant for processing lubricating oil was designed and constructed by E. B. Badger & Sons Co., Boston.

PIPING INSULATION—THICKNESS, IN.

Pipe size	Protection insul. only	Temperature range (permanent hot pipe surface)														
	201 - 600° above	601 - 250° High temp.	201 - 250° Mag.	251 - 400° Mag.	401 - 550° Mag.	551 to 800 High temp.	Mag.	Total	801 to 1,000 High temp.	Mag.	Total	1,001 to 1,200 High temp.	Mag.	Total
½	⅞	1	⅞	⅞	1½	2		2	2		2			
¾	⅞	1	⅞	⅞	1½	2		2	2		2			
1	⅞	1	⅞	⅞	1½	2		2	2		2			
1½	⅞	1	⅞	⅞	1½	2		2	2		2			
2	33 32	1¼	33 32	33 32	1½	2		2	2		2			
2½	33 32	1½	33 32	33 32	1½	2		2	2		2			
3	33 32	1½	33 32	33 32	1½	1 ⅞	1½	3 ⅞	1 ⅞	2	3 ⅞	2 ⅞	1½	3 ⅞
4	1⅛	1⅞	1⅛	1½	2	1 ⅞	1½	3 ⅞	1 ⅞	2	3 ⅞	2 ⅞	1½	3 ⅞
6	1⅛	1½	1⅛	1½	2	1½	2	3½	1½	2½	4	2	2	4
8	1¼	1½	1¼	1½	2	1½	2	3½	1½	2½	4	2	2	4
10	1¼	1⅞	1¼	2	2½	1½	2	3½	1½	2½	4	2	2	4
12	1½	1⅞	1½	2	2½	1½	2	3½	1½	2½	4	2	2	4
14	1½	1⅞	1½	2	2½	1½	2	3½	1½	2½	4	2	2	4
16	1½	1⅞	1½	2	2½	1½	2	3½	1½	2½	4	2	2	4
18	1½	1⅞	1½	2	2½	1½	2	3½	1½	2½	4	2	2	4
20	1½	1⅞	1½	2	2½	1½	2	3½	1½	2½	4	2	2	4
24	1½	1⅞	1½	2	2½	1½	2	3½	1½	2½	4	2	2	4
26	1½	1⅞	1½	2	2½	1½	2	3½	1½	2½	4	2	2	4
28	1½	1⅞	1½	2	2½	1½	2	3½	1½	2½	4	2	2	4
30	1½	1⅞	1½	2	2½	1½	2	3½	1½	2½	4	2	2	4

EQUIPMENT INSULATION

Temperature range, °F.	Thickness of insulation, in. High temp.	Mag.	Total
250 to 395		2½	2½
400 to 599		3½	3½
600 to 749	1½	2½	4
750 to 899	2	2	4
900 to 1,000	2½	2	4½

Sunray Gets Good Results From Water-Flood Project

A water-flood secondary-recovery project has pushed oil production on a Greenwood, Kans., lease from a "normal" of 34 to more than 1,050 bbl. daily and has increased the crude reserve potential of Sunray Oil Corp. an estimated 1 million barrels, according to a report by the company's engineers. Sunray's highly successful water-flooding project is on the Fankhauser lease unit, in Section 4-22s-12e. Production is from the Bartlesville, just under 2,000 ft.

First drive water was injected on February 10, 1949. Seven of the 23 wells on a 500-acre tract have already responded to the flood repressuring.

Fastest and simplest ram changes in ANY cellar control gate . . .

Although Shaffer Cellar Control Gates have always been noted for quick and easy ram changes

THE NEW SHAFFER HYDRAULIC CELLAR CONTROL GATE

sets a new high in speed and simplicity in changing rams.

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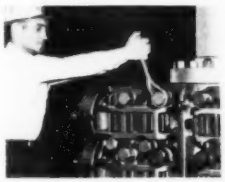
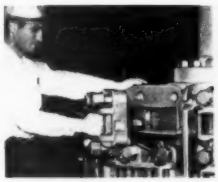
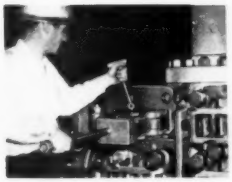


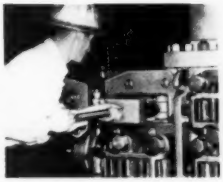
1. Unbolt Two Doors in the side of the Gate. You don't even have to remove the bolts—they remain in the doors where they can't become lost.



2. Swing the Doors Open and pull out the ram assembly. There's nothing to loosen, unlock or disengage. It slides right out.



3. Lift the Rams from the Gate and simply replace the Ram Blocks and rubbers with others of the desired size and type.

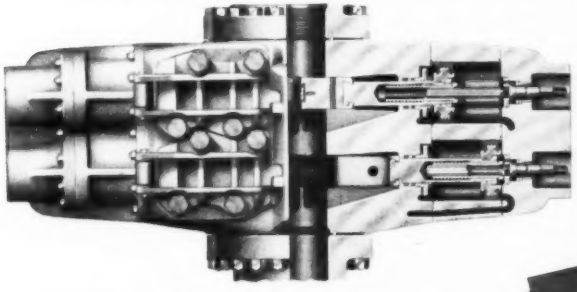


4. Slide the Ram Assembly back into the Gate, close and bolt the doors. Closing the doors automatically aligns Ram Assemblies within Gate.

It's as simple as that—and as fast. And here's another important feature—you can make a complete ram change *whether the pipe is in or out of the hole!*

Best of all the unusual speed and simplicity with which rams can be changed is only one of *many* vitally important advantages that Shaffer engineers—pioneers in the development of high pressure control equipment—have incorporated into the Shaffer Hydraulic Cellar Control Gate. A few of the many other features are outlined at right. But be sure to get the *complete* story before you buy *any* cellar control gate equipment. No other equipment provides so much protection—in such a compact space—with so many operating advancements as . . .

The SHAFFER HYDRAULIC CELLAR CONTROL GATE!



The sectional view above shows how two separate ram compartments are unitized into one compact body. Note the self-draining bottoms of the ram compartments . . . the direct hydraulic drive . . . and the completely enclosed design of the Shaffer Hydraulic Cellar Control Gate!

Write for the new Shaffer 1950 Catalog that gives full details on the Shaffer Hydraulic Cellar Control Gate as well as on other Shaffer products!

See pages 4433 to 4496 of the 1950 Composite Catalog.

Additional unique features in the Shaffer Hydraulic Cellar Control Gate

- **SPACE SAVING COMPACTNESS:** Two separate ram compartments are unitized into one body, yet the *overall* height of the entire Gate, including *both* compartments is only 30" even in sizes as large as 13⅝". Smaller sizes even less!
- **COMPLETELY ENCLOSED DESIGN:** All moving parts, including piston rod ram shafts, are completely enclosed within the body of the Gate. No moving parts project from the Gate—nothing to become damaged or wedged by falling objects or loose timbers in the cellar, nothing to become corroded by salt fluids or chemical muds dripping into the cellar. This means greater safety, less maintenance!
- **DIRECT HYDRAULIC DRIVE:** Hydraulic operating cylinders are *directly behind* the rams for direct action, maximum simplicity, greatest safety. No secondary connections between hydraulic cylinders and rams!
- **SELF-DRAINING BODY:** The rams travel on high narrow guide ribs raised above the steeply-sloped bottoms of the ram compartments. Mud and sand quickly drain back into the well—no detrimental accumulations to interfere with free operation of the rams!

These and still other unique features make the Shaffer Hydraulic Cellar Control Gate the outstanding *hydraulic* gate available today. Get full details from your Shaffer representative—or write direct!

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The cleaning of paraffin out of a *Free Pump* well requires only the insertion of a Kobe Soluble Plug in the injector, as shown in the photograph, right. By a turn of the 4-Way valve handle, oil pressure is directed down the tubing, pushing the plug through the paraffin zone.

The wax dislodged from the walls of the tubing by the moving plug is then pumped out with the production oil. The plug, being soluble in oil, dissolves. The ease and speed with which the job is done makes it possible to keep wax continually under control.

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Free Pump

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THESE ARE THE DAYS OF FREE PUMPING

Analysis of FRACTURED Limestone Cores

by Frank C. Kelton*

ATTEMPTS to core Devonian, Silurian, and Ordovician horizons usually have been characterized by poor recovery. With the advent of diamond coring and the increased efficiency in drilling and coring operations, cores obtained from these formations were surprising and in some cases disappointing. Good recovery from these formations led to speculation as to the feasibility of analysis and the meaning of data obtained from conventional analysis. Results indicated that data obtained by conventional methods would be of little value. From visual inspection it was apparent that the effective porosity and permeability were contained in fractures and solution cavities and not in the primary crystalline structure of the formation. It was evident that the entire core must be analyzed instead of small fragments.

Procedures have accordingly been developed which seem to meet this requirement, and to date nearly 3,000 large core samples have been analyzed. It is the purpose of this paper to describe the methods used, to present typical results for several fractured formations and to compare the data obtained by this special analysis with that obtained by conventional analysis. Certain modifications and alternative procedures are finally suggested to speed up the analysis.

Analysis Procedure

Fluid saturations and porosity. — The core sample, in segments up to 15 in. in length, is marked, weighed, and examined under ultraviolet light to determine the presence of oil saturation. If present, the approximate quantity of oil and its location on intercrystalline, fracture or vugular surfaces is noted. This information is carefully recorded. The degree of fracturing and/or vugular development is also noted. The sample is then placed in a pressure cell and the air evacuated with a high-speed vacuum pump. This evacuation is continued only long enough to reduce the pressure to approximately the vapor pressure of water in order not to remove excessive amounts of water.

Water is admitted to the cell and allowed to penetrate the sample under atmospheric pressure, filling the pore space initially occupied by air and replacing the small amount of water removed by evacuation. Pressure up to 200 psi. is applied to force water into the smaller capillaries, and the sample is left submerged under pressure for an hour or longer. It is then removed from the cell, surface water wiped off, and reweighed. The gain in weight is a measure of the gas content of the original sample.

The sample, now fully saturated with oil and water, is placed in an extraction pot and covered with toluene. The pot is placed in an insulated oil bath connected to a jacketed condenser tube, and allowed to heat up until the water of the sample and the toluene are vaporized. This process is the familiar Dean-Stark extraction. As the water is condensed it drops into the receiving tube and collects at the bottom while the condensed toluene runs back into the pot. The water is drained from the receiving tube at intervals and measured.

The largest part of the water in the sample is removed after 1 day's extraction, but the remainder comes over very slowly. Typical rates of water removal are shown for various formations in Fig. 1. Since it is necessary to determine the water content to within a fraction of a cubic centimeter in order to be able to determine the oil content accurately, the process is continued until the amount of water removed daily has dropped to 0.1 to 0.3 cc. This may require from 3 days to 3 weeks or even longer; the average time is about 1 week. During this time the oil content of the core sample is being replaced by toluene.

If the visual examination showed oil saturation only on fracture planes and/or vugular surfaces, the extraction is assumed to be complete when there is no sensible gain in water in the receiving tube. If, on the other hand, the examination indicated oil in intercrystalline pore spaces, the extraction of oil may not be complete, and in this case the sample is removed from the pot and placed on an oversize Soxhlet extractor where extraction with toluene is continued.

After extraction is complete, the sample is placed in a constant-temperature oven and dried for a period of 1 to 2 days. After cooling to room temperature, it is reweighed. The loss of weight, less the amount of water

Fig. 1—(Below) Rate of water extraction

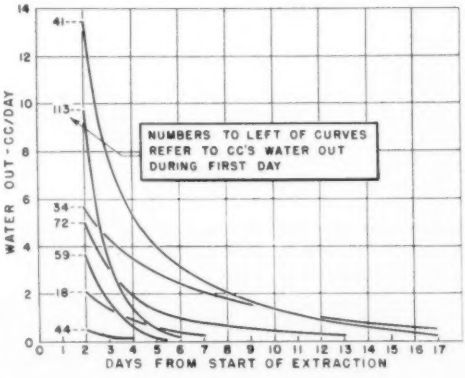
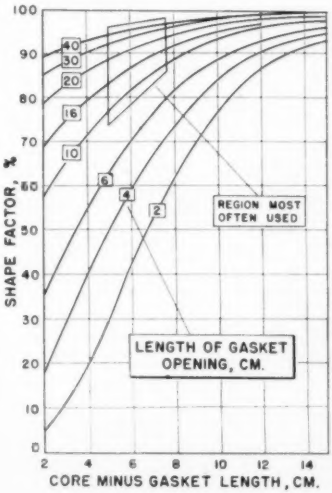
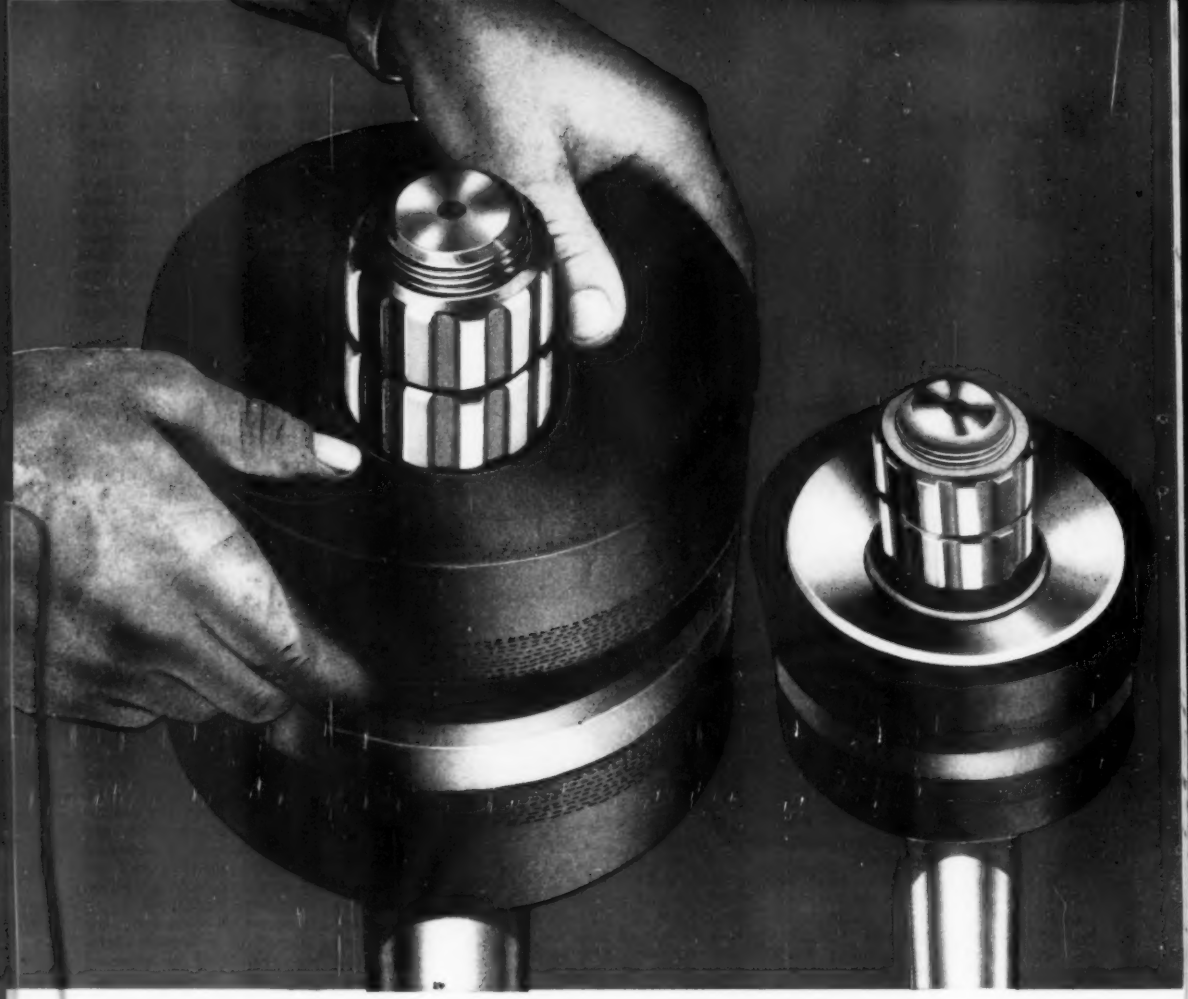


Fig. 2—(Right) Shape factor



*Core Laboratories, Inc., Dallas. Portion of paper presented at meeting of Petroleum Branch, A.I.M.E., San Antonio.



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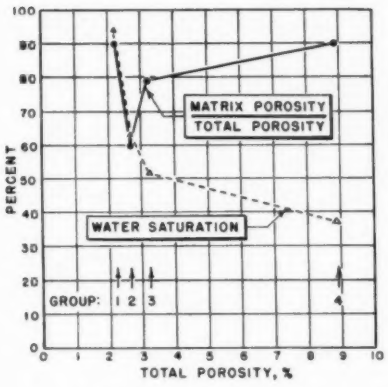

Fig. 3—Matrix porosity vs. water content

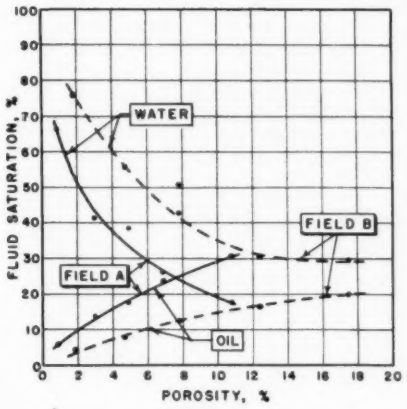

Fig. 4—Saturations vs. porosity for two fractured formations

measured during the extraction, is the weight of the oil contained in the sample. This weight is corrected for an assumed density of oil to give the volume of oil in the sample. The summation of oil and total water gives the pore space of the sample.

A representative number of samples are immersed in water until capillary penetration of water has for practical purposes ceased, and their bulk volumes determined by the buoyancy or apparent decrease in weight when immersed in water. An average true grain-density figure is thus obtained, which is used together with the extracted weights of the other samples to determine their grain volume, and pore volume is added to give bulk volume. Pore volume divided by this bulk volume gives the porosity.

Permeability.—The extracted sample, or the largest segment if the sample consists of more than one piece, is placed in the cylindrical holder, and the sides of the core covered with two rectangular rubber gaskets, with openings whose length extends to within 1 to 1½ in. of the shortest length of the core and whose width extends over about one-fourth the circumference. Two sections of split pipe of suitable diameter and with hinged pieces along their sides to provide a good fit, are placed around the gaskets, and a number of stranded wire cables are wrapped around the pipe. By means of a crank and worm gear these cables are tightened simultaneously so that considerable pressure is applied to all sides of the gaskets. This seals the core except for the two rectangular openings in the gaskets, a thin line along the sides of the core between the gaskets, and the ends of the core.

Air pressure is applied to the opening on one side of the core, and the rate of air flow out of the other side is measured directly by means of a burette and soap film so that no back pressure is exerted on the downstream side. Permeability is calculated as though the flow were uniformly distributed across the rectangular cross-section between the gasket openings and through the length between the straight edges of the gasket openings. Corrections are then applied to take into account the nonlinearity of flow and the loss through the ends of the core and through the thin slits between gaskets.

The orientation of the core in the holder is such that the flow is across the direction of principal fracturing. The permeability so obtained is designated as Kmax. The core is then turned 90° in the holder and permeability again measured. This is called K90°.

The correction applied to take care of the loss of air through the ends of the core is called the shape factor. Typical values of this factor, for a 3-in. core, are shown in Fig. 2. This shape factor is proportional to the fraction of entering air that gets to the gasket opening on the opposite side of core. In addition to the above shape factor, a constant factor is applied to take care of the widening of the flow lines and loss of air at the sides between the gaskets.

Correction factors were derived by extensive experiments on a synthetic core of nearly uniform permeability. The flow through a series of gasket openings was measured using a long core, and the series of measurements repeated after cutting off 2 cm. at a time from each end of the core. A direct measurement of the permeability of each such section of the core was then made. A subsequent check was obtained from electrolytic model experiments simulating the nonlinear flow through the core.

Discussion of Procedures

Fluid saturations and porosity.—Two checks are available on the porosity as determined by the above outlined procedure. If the sample, after extraction, is allowed to cool under toluene and then weighed prior to drying, the weight of toluene divided by its specific gravity furnishes a check on the porosity. Another check is furnished, after extraction and drying, by resaturating the sample with water and determining the weight increase. The agreement here is also good.

If there is a question as to whether the volatility of a particular oil might give rise to incorrect saturations if vacuum is applied, the technique of resaturation after extraction may be used. It is also used where there are a large number of surface vugs. In this case the extraction is carried out directly in the original sample. The extracted and dried sample is then sprayed with a webbing plastic material which bridges the gaps across the surface vugs. Additional plastic is applied until a coating is built up which is thick enough to prevent loss of water from the vugs but still permeable enough to permit the entrance of water when vacuum and pressure is applied. Actual experience has indicated that this method of applying a plastic coating is required in only a small percentage of cases.

Permeability.—It has been suggested that the use of the above-mentioned clamp-type permeameter may give rise to considerable error due to the end effect when dealing with fractured core samples, i.e., there may

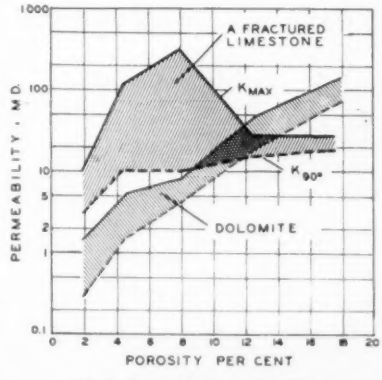

Fig. 5—Permeability vs. porosity

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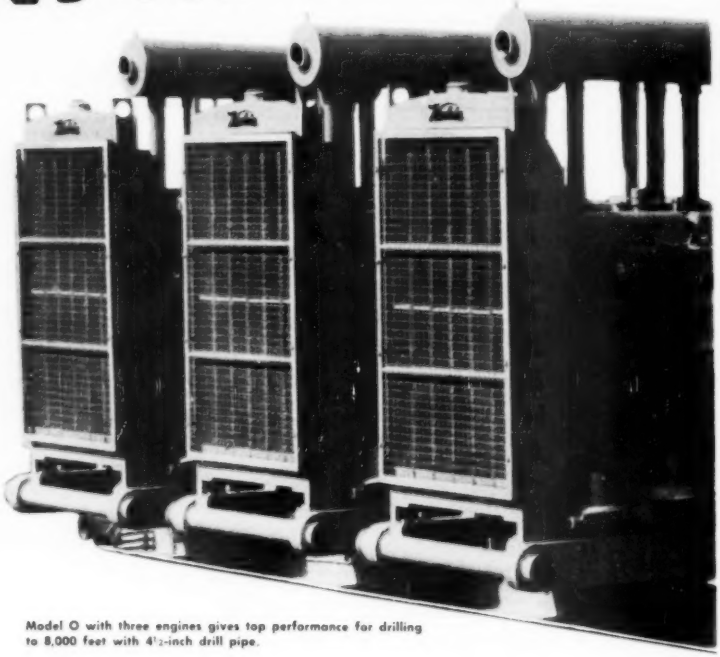
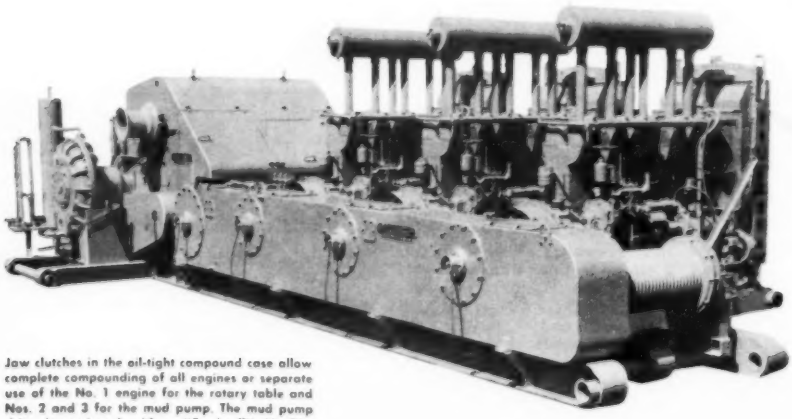
BIG, rugged, powerful—that's the Model O draw works with three engines. It answers the need for a high performance, deep well drilling rig that is easy to operate and inexpensive to maintain. With three engines developing 600 H.P., adequate mud pump power and faster hoisting speeds are always at the driller's fingertips.



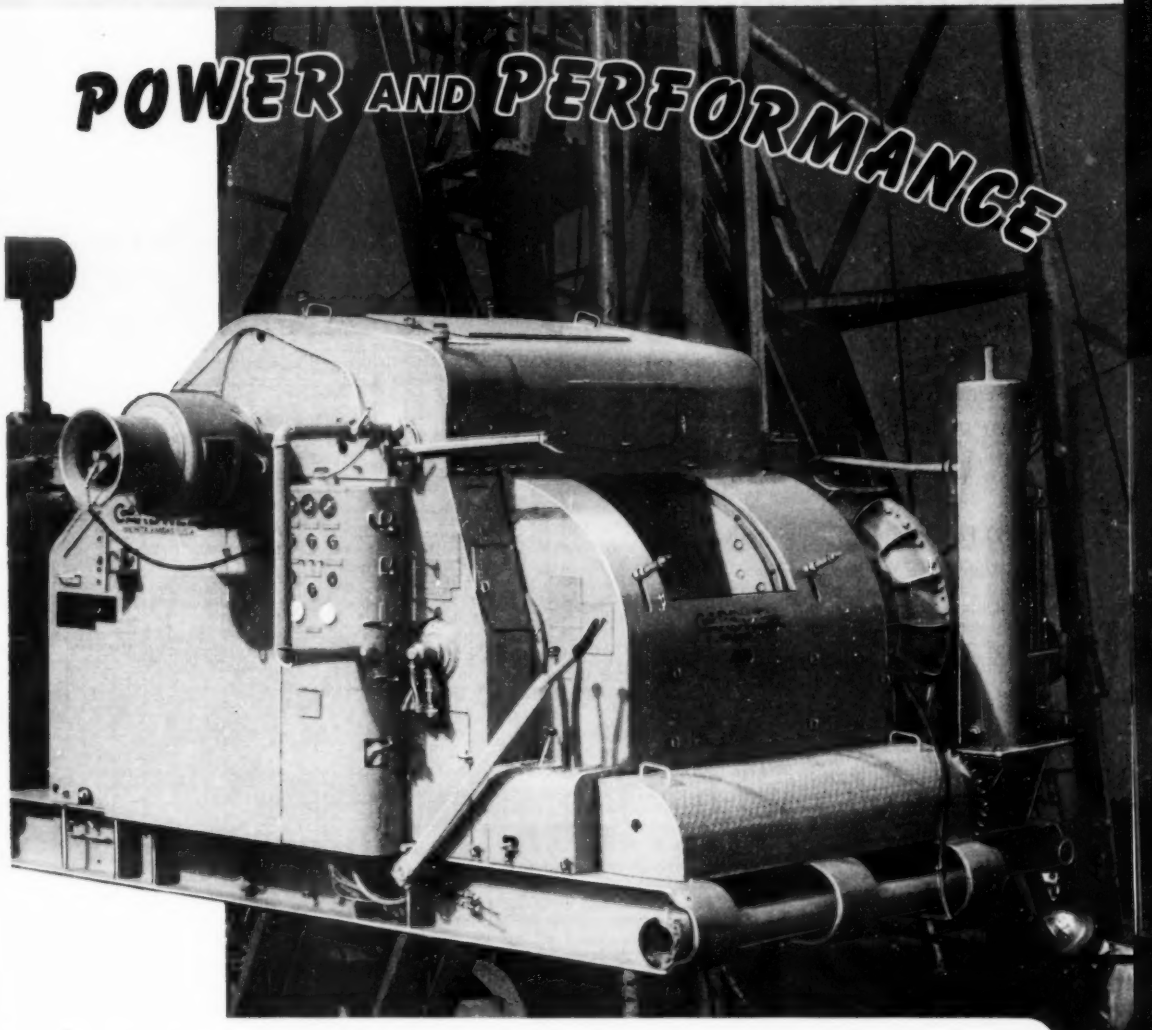
Model O with three engines gives top performance for drilling to 8,000 feet with 4½-inch drill pipe.



Jaw clutches in the oil-tight compound case allow complete compounding of all engines or separate use of the No. 1 engine for the rotary table and Nos. 2 and 3 for the mud pump. The mud pump drive is equipped with a "Cardwell" Air Disc friction clutch.

MODEL O DRAW WORKS...

POWER AND PERFORMANCE



The Model O is completely air controlled. "Cardwell" Air Disc friction clutches, used in both ends of the main drum, provide two instantly available speeds for each of the three transmission ratios. Model O is also available with manually-controlled friction clutches. The draw works and three engines are mounted on a heavy, three-rail main skid and when necessary, the engines can be easily removed for transporting. Sand line drum assembly and hydromatic brake are available.

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WILCOX SAND IN HAMEL AREA COLORADO COUNTY, TEXAS

Mud (Water & Clay): R_m = 1.0 ohms at BHT
Bit Size: 7⅞"
Spacings: AM = 16"
AM' = 63"
AO = 24'

This is the fifth in a series of interpreted electrical logs from identified formations and fields which Schlumberger will reproduce in this publication. If you would like to keep this entire series, please write to us on your letterhead and we will be glad to send you a reprint of this log (and preceding logs in this series) with a binder in which you may file subsequent logs as they are published. This series is made possible through the courtesy and cooperation of the oil operators who have released these logs.

5

LOG ANALYSIS

1) Water saturation S

Resistivity at water level R_o = 1.2 ohms

At level A: $S = \sqrt{\frac{1.2}{11}} = 33\%$

At level B: $S = \sqrt{\frac{1.2}{6.5}} = 43\%$

2) Formation water resistivity R_w

With $SP = -90 \log_{10} \frac{R_m}{R_w} = -130$ mv.,

R_w = 0.036 ohm at BHT

3) Porosity p

$F = \frac{R_o}{R_w} = \frac{1.2}{0.036} = 33$

$p = \sqrt[m]{\frac{1}{F}} = 18\%$ m = 2

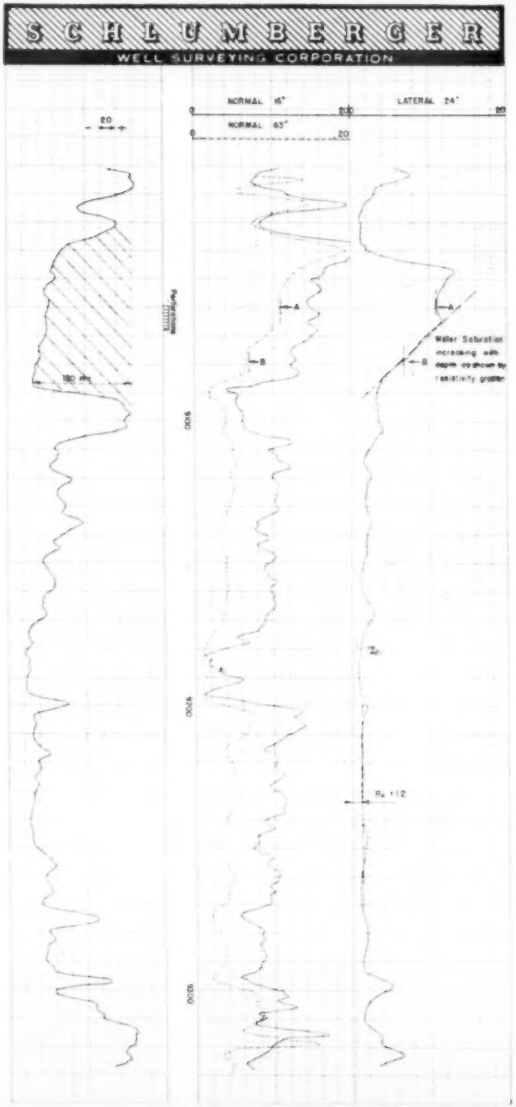
CORE ANALYSIS

Average Porosity	20%
Average Permeability	150 md.
Residual Fluids	50%

PRODUCTION RESULTS

Perforated: 9060.5-9068.5 with 48 shots
Initial Production: 242 bbls. oil 37° API
Gas oil ratio: 2285/1

Water and gas increasing with time.



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be a channel connected to one end of the core which carries a disproportionately large amount of air. It is not denied that this may occur in some instances, but it is believed that the errors will be in both directions and will tend to balance out when a large number of samples are measured. The accuracy of any one measurement it not high, but the approximate magnitude of the "equivalent" permeability is at least indicated and the measured value does take into account the flow capacity of both the matrix and the fracture or vugular system. Measurements so far made on samples of intergranular porosity have shown reasonable agreement with permeabilities of drilled plugs from the samples.

Results from Typical Formations

Matrix measurements.—After obtaining analysis results on large cores from a section of Ellenburger formation from Fullerton field, additional measurements of matrix (on small portions of cores) porosity and permeability were proposed in order to obtain a clearer understanding of the relationships involved. Fortunately the available samples showed a rather wide variety of characteristics ranging from dense and finely fractured to spongy, vuggy formation.

In Table 1 a summary is presented

TABLE 1—MATRIX VS. WHOLE CORE DATA ELLENBURGER, FULLERTON FIELD

Group—	1	2	3	4
Gas, % bulk	0.08	0.91	0.63	3.72
Oil, % bulk	0.06	0.06	0.88	1.84
Water, % bulk	2.07	1.65	1.66	3.27
Matrix porosity, % bulk	1.96	1.58	2.56	7.92
Total porosity, % bulk	2.21	2.62	3.17	8.40
Kmax, md.	10	409	23	94
K90°, md.	0.6	1.2	10	38
Matrix K	0.3	0.2	0.3	3.7

of average values of fluid contents, porosity and permeabilities by special analysis, and average values of porosity and permeability of matrix samples. The latter were small (¾-in. diameter) drilled plugs. Matrix porosity was determined by the vacuum-saturation method, but pressure was not used. Fig. 3 is a graphic comparison of the averages of water saturation (as per cent of pore space) with the average ratio of matrix to total porosity, for the four groups.

Table 1 and Fig. 3 show agreement, considered good for the number of samples represented, between the water content for groups 1 and 2 and the matrix porosity. However, this agreement disappears for groups 3 and 4. This illustrates that matrix-porosity measurements would be an approximation to the water content of the large cores, and hence useful in reserve estimates, only when the matrix is dense and representative pieces can be selected such that no small vugs or intergranular porosity is included.

The magnitudes and ratios of Kmax and K90° in the different groups reflect the amount and distribution of secondary porosity between fractures and vugs.

Average data for several formations.—Table 2 presents a summary of

TABLE 2—SUMMARY OF AVERAGE DATA

Formation—	Per cent bulk— Porosity	Water	Oil	Kmax	K90°
Ellenburger composite	2.38	1.41	0.39	96	7.8
Fractured limestone	9.05	4.14	1.12	106	12
Dolomite	8.72	3.65	1.31	42	19

special analysis data for three types of formation. The "Ellenburger composite" consists of low-porosity fractured formations, Ellenburger and Devonian. The "fractured limestone" includes considerably higher porosity samples with considerable fracture and vug development. The "dolomite" average is a composite of data from three crystalline dolomite formations possessing only very slight fracture development. The average water saturations, which are, respectively, 60.0, 45.8, and 41.8 per cent of pore space decrease in the same order that the K90° values increase. The average oil saturations are, respectively, 16.6, 12.4, and 15.0 per cent of pore space. On the assumption that the measured water content is equal to the connate water content, the calculated values of reservoir oil in place are, respectively, 73, 381, and 432 bbl. per acre-foot.

Water and oil saturations of a fractured limestone are plotted in Fig. 4 as "Field B," where they are compared with the corresponding water and oil saturations of a considerably lower porosity fractured Devonian formation, "Field A." It may be noted from Fig. 4 that the water saturation for the highest porosity group in Field B is practically the same as the water saturation for the next highest porosity group, in contrast to what one might expect from capillary considerations. This same effect has been noted in other cases; in some, the water-saturation curve shows a decided minimum.

This may be due to one of several physical causes. It may be a reflection of the connate-water characteristics of the reservoir, caused by qualitative changes in the character of the pore space. Or it could be due to differences in relative permeability characteristics in the low and high porosity formation. Flushing of pore space with water from the drilling mud may have occurred, and subsequent expulsion of water by liberated gas as the core was raised to the surface may have resulted in a final water saturation higher than the original connate water saturation.

Another possible cause is statistical, known definitely to be of appreciable effect. The water saturations are averaged in groups with porosity as a parameter. Since there is not a one-in-one correspondence between individual values of porosity and saturation, the average saturation for the next to highest group includes some low values which correspond to the porosity group below it and some high values which correspond to the porosity group above it. The average saturation for the highest porosity group can draw upon some values corresponding to the porosity group below it, but none for a higher porosity group; therefore, the average saturation for this end group is higher than would be the case if there were still a higher porosity group present.

The interrelationships between measured quantities appear very similar to those for sandstone or nonfractured reservoirs, but with certain differences in the magnitudes of the porosity and in the directional character of the permeability. If one considers the fractured reservoirs in terms of larger volumetric units, the differences in reservoir behavior between these and sandstone reservoirs become a matter of degree, not of kind.

Comparison of Special and Conventional Analysis

A portion of each sample used for special analysis was set aside and run by conventional methods of analysis. These samples were from three different reservoirs of crystalline dolomite. The extent of fracturing was so slight that it can be neglected insofar as its effect on porosity and fluid saturations is concerned, although possibly not in regard to permeability. The resultant average values for porosity, oil, water and gas bulk, and Kmax, K90°, and conventional permeability, are shown in Table 3.

Difference in porosity is seen to be due to the combined effect of a higher water bulk by special analysis and a higher gas bulk by conventional analysis. In the special analysis there is evidence that in some cases the measured gas content is slightly low. In the oil-content determination there are sources of possible error which,

TABLE 3—COMPARISON OF SPECIAL AND CONVENTIONAL ANALYSIS

Dolomite—	Special analysis	Conventional analysis
Porosity, % bulk	8.7	9.6
Oil, % bulk	1.3	1.2
Water, % bulk	3.7	2.2
Gas, % bulk	3.7	6.2
Kmax, md.	42.1	
K90°, md.	18.9	26.9

however, tend to compensate each other except in extreme cases which can usually be anticipated. Incomplete extraction of oil by the toluene results in low measured oil content, whereas incomplete removal of water gives high measured oil content. In general, the measurement of wa-

(Continued on page 144)

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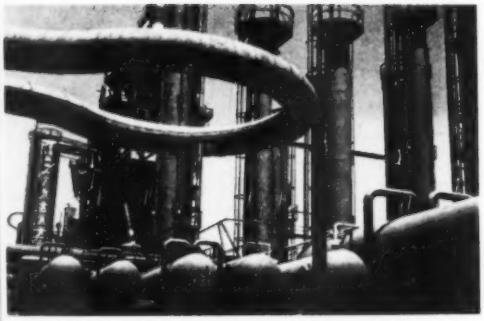
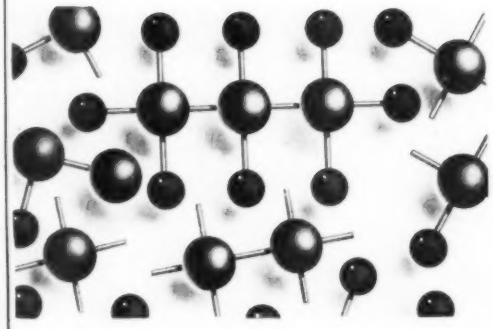


to conceive, plan and build plants . . .



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Engineering and Construction Division

JONES & LAUGHLIN SUPPLY COMPANY

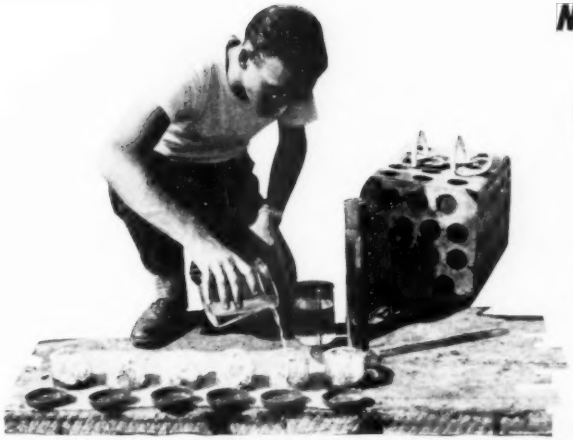
TULSA, OKLAHOMA

NEW PACKAGING METHOD AIDS

CORE ANALYSIS

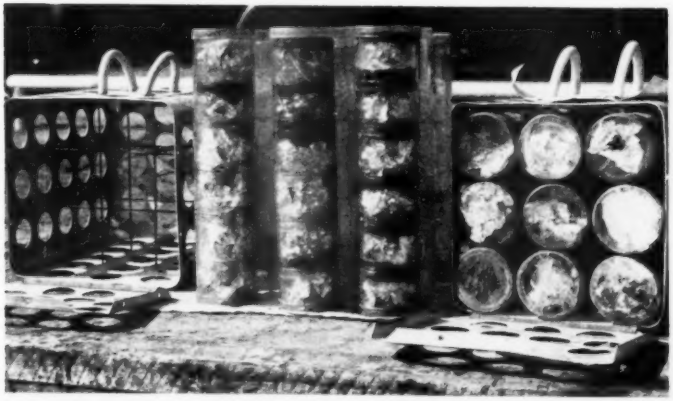
by reducing breakage, loss of fluids, other handling troubles

by Robert Harwick
District Editor



After cores are wrapped in aluminum foil, a clear plastic resin is poured into the container holding the core

Caps are placed on the individual containers after the plastic has set. The core containers are placed in plastic core tubes



The core tubes hold six cores approximately 3 in. long by 2½ in. in diameter. The core tubes are placed in specially built aluminum carrying cases

BETWEEN the removal of a core from the core barrel and receipt of the core report there is a lot that may happen which can affect the analysis and indicate conditions different from those that actually exist in the formation. Breakage through handling is a problem. Loss of fluids from the sample seriously affects accurate interpretations. The amount of fluids lost is roughly in direct ratio to the time elapsed between taking the core and delivery at the laboratory. If time becomes excessive the appearance of the core will change through action similar to weathering.

A recently developed method of core packaging overcomes to a great degree these core-handling problems and makes the standard and uniform techniques of a central laboratory available to the operator. The method is simple, effective, and easily applied. The shape of the core as well as the fluid content is preserved for an indefinite period. The sample, after packing is complete, is highly resistant to the very rough handling often encountered during shipment.

The new packaging process is a development of Petroleum Engineering Associates, Pasadena, Calif. The packaging is done at the drilling site as the cores are removed from the barrel. The job of packing is usually handled by a representative of the company.

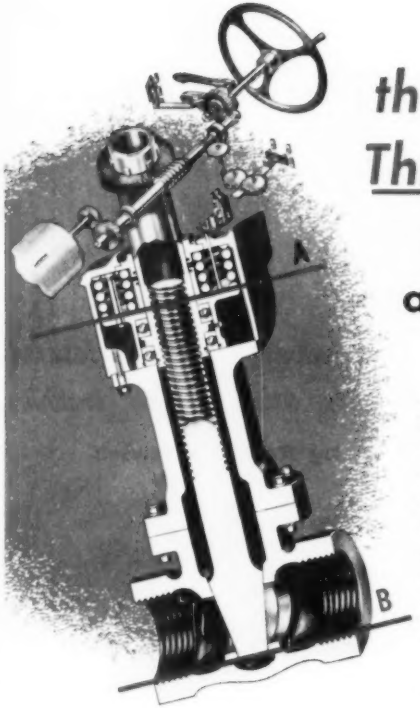
Cores are taken from the barrel and immediately wrapped in heavy aluminum foil by the field sampler. The foil-wrapped core is then placed in a special individual container. The container is made of clear plastic and is gas, oil, and waterproof. A tag or label identifying the core and carrying a brief report on drilling conditions is also set in the container.

The sampler then pours enough synthetic plastic resin into the container completely to surround and

Cutler-Hammer TNY

the Valve Operator with Thrust Controlled Seating

that assures absolutely safe, accurate and consistent seating

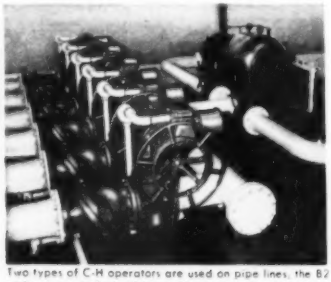


The principle of the unique Thrust Controlled Seating of C-H TNY operators

During seating movement, Fulcrum is at A (above) and drive is down, toward the valve seat. At moment of tight seating, Fulcrum transfers to B (below) and further drive is upward, against the springs, which trip the *THRUST* switch and absorb the drift energy of the motor.

As every practical operating man knows, the problem of *mechanized* valve operation is the problem of seating the valve to the required degree of tightness without undue strain upon any of the valve parts —in the face of conditions that vary widely not only from installation to installation but from time to time on the same valve.

There is one system of valve operation that *does* seat valves accurately, safely, without need of manual seating or back-off, without danger of jamming . . . the Cutler-Hammer TNY Valve Operator with *THRUST* controlled seating. With this unique feature, the motor *positively* drives the valve disc home. During the driving period, the "fulcrum" is established at the yoke nut by heavy steel springs which exactly balance *tight seat pressure*. Therefore, *at the exact instant of desired tight seating, the driving fulcrum transfers to the seat of the valve*, hence any further drive is into the heavy springs themselves which trip the *THRUST* switch and harmlessly absorb motor drift. The amazing thing is, the same degree of tight seating is maintained as valve parts expand and contract. No other valve operator has this direct *THRUST* controlled feature. No other valve operator can be as safe and sure and accurate. You can get C-H TNY as standard equipment on all leading makes of valves. CUTLER-HAMMER, Inc., 1453 St. Paul Ave., Milwaukee 1, Wis.



Two types of C-H operators are used on pipe lines, the BZ with **automatic declutching** on Plug Valves, for instantaneous stop, and the TNY on Gate Valves for **thrust** seating.

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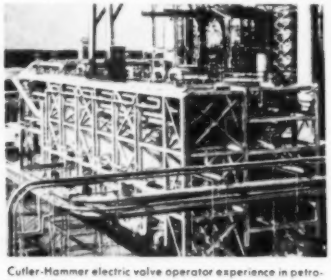
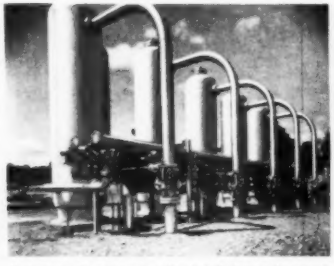
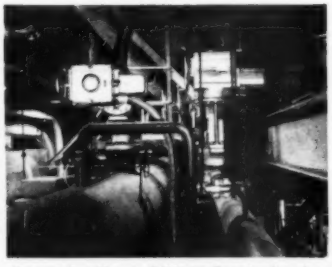
CUTLER-HAMMER
VALVE CONTROL
C-H



Cutler-Hammer electric valve operator experience in petroleum refining spans the entire decade since advanced processes brought the first units into use.



From the earliest of gas handling installations to the newest of the underground storage jobs, leading engineers have selected C-H Electric Valve Operators.



For more than 40 years C-H Valve Operators have been the overwhelming choice of power plant and waterworks engineers.

The cases hold nine tubes if 2½-in. cores are being shipped. Larger size cores are handled in tubes and cases sized accordingly

cover the wrapped core. The resin is transparent and the label is easily read through it.

The resin used is poured at atmospheric temperature and pressure. It sets up within a few minutes, providing a hermetically sealed casing for the core sample. Once set, the plastic provides protection of sufficient strength to preserve the original shape and to retain all fluids within the sample until delivery at the laboratory.

After the resin is set, the individual core containers are placed in core tubes which are also made of clear plastic. Each tube holds six of the individual core containers. The tubes, in turn, are packed in an aluminum carrying case. The result is 54 core samples individually sealed and packaged ready for air freight or other shipment. This number holds only for 2½-in.-diameter cores about 3 in. long. Other diameters and lengths are appropriately packed.

For the packaging process the plastic tubes and containers are received with one end already sealed. Once the container has received the sample, a plastic cap fits on tightly as a cover. These tubes and containers are shaped especially for this purpose by Extruders, Inc., of Culver City, Calif.

On receipt at the Pasadena laboratory the cores are unpacked from the shipping containers and core tubes. The individual containers are then cut with a hardened saw and split open. The core comes free with the aluminum foil adhering to the hardened plastic.

The core, in the same condition as when taken from the drilling site, is ready for analysis in a laboratory equipped to 24-hour reports on effective porosity, relative permeability with respect to air, oil, and water saturation.

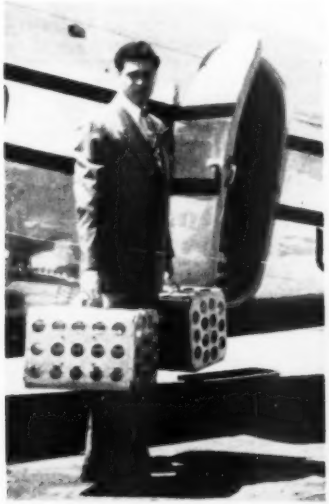


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Fig. 1—Complete portable refraction seismograph unit on location at northeast corner Outer Drive and East McNichols Road, Detroit, testing ability to determine depth to bedrock. Shown are: Richard Wesley, of Wesley, Bedford & Stickel, consulting engineers; Arnold D. Barnes, Century Geophysical Corp.; and John F. Stickel, Wesley, Bedford & Stickel

Seismograph Aids Foundation And Construction Work

by Charles J. Deegan
Associate Editor

WHEN a construction job involves excavation work, the engineers or the contractors usually take a series of cores to obtain knowledge of the varying thickness of overburden above the bedrock, the general composition of the overburden, and some idea of the subsurface attitude of the bedrock.

Construction engineers in the petroleum industry will be particularly interested in knowing that, in some cases, a new application of the seismograph (commonly used in oil-exploration work) offers certain advantages over the conventional coring methods.

A complete profile of depth to bedrock for a considerable distance along any given line can be obtained by the seismograph at one setting. Furthermore, a considerable amount of information about the nature of the overburden, including any important variations in its makeup from place to place, can be obtained by geological interpretation of the seismograph record.

After a little practice, such interpretation may also be possible for an experienced construction engineer, when he is familiar with the general nature of the variations in the makeup of the overburden in a particular locality. If it seems advisable, a subsurface contour map of the top of the bedrock can be obtained by making a series of interesting seismic profiles.

The construction engineer and the geophysicist are both interested in variations in the compactness of the earth at various levels. The construction engineer wants to know how far he must excavate to reach firm, compact bedrock for his foundations. The geophysicist, using his seismograph, can tell him the answer because of one of the properties of sound. Sound waves travel faster through compact rocks than they do through less-consolidated material. The more compact the material, the faster the sound wave travels through it. For instance, by placing one's ear directly against a railroad rail, one can detect an approaching train much sooner than any sound from it can be heard through the air.

Essentially the seismograph is simply a coupling of very sensitive receiving devices that pick up faint sounds at given distances from the source of the sound (usually an explosive charge), and measure to the thousandth of a second the arrival time of that sound at each receiver. In construction work, variations in the travel speed of the sound waves through the less compact overburden and the more compact bedrock are detected. Fairly simple mathematical computations, based on well-known physical laws, then enable the geophysicist, or the engineer, to obtain the answers he needs.

The variations in compactness of earth formations, and therefore the variations in speed of sound-wave travel, might seem troublesome to a person not technically trained. To the geophysicist, who has worked in oil-exploration problems, the variations are not at all within critically narrow limits. Time is the only major factor with close limits, but the instrumentation problems of consistent accuracy in time measurements under field conditions were solved long ago for oil exploration work.

In determining overburden versus bedrock, the geophysicist is dealing

Fig. 2—Another view of same location as in Fig. 1, taken on different date. Note that this time equipment was all loaded into a station wagon. John F. Stickel at control panel of recording unit; Richard Wesley in distance at right

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with velocities that usually have a high contrast. Sound velocities in dry sand or loose unconsolidated fill may be of the order of 2,000 ft. per second; in shale it may be around 8,000 ft. per second; up around 16,000-18,000 ft. per second in limestone; and in granite 20,000 ft. per second.

Among some of the newer applications and potential uses of the seismograph in construction work are:

1. Determination of depth from surface to bedrock.

2. Determination of nature of material to be removed in cuts for highway construction.

3. To detect buried boulders, or buried remainders of old construction projects, such as piers, wharves, retaining walls, etc.

4. Locating and tracing the outlines of filled-in old excavations; old filled-in canals, etc.

5. In the study of prospective dam sites.

6. In vibration-analysis studies; either detection of unusual vibrations in engineering plants, or for the study of natural frequencies of buildings or other structures.

7. In parts of the country where a well-defined water table exists, to determine locally the depth to underground water sources.

For use on construction problems, the seismograph (the refraction type is used) has been redesigned to an almost miniature scale compared to the sizes used in oil exploration. The dynamite charge ranges from 1 oz. to 1 lb., set off in a shot hole 2 to 5 ft. deep. This compares with charges of 25 to 250 lb., in shot holes 50 to 250 ft. deep in oil exploration. In construction work, the geophones (sound detectors) are spread out over a line ranging from 100 to 1,000 ft. in length. In oil-exploration work the spread may range from 5,000 to 25,000 ft.

This miniature-sized equipment makes for easy portability and quick handling. Fig. 1 shows a portable refraction seismograph unit made by Century Geophysical Corp., and used on a job in Detroit, at the northeast corner of Outer Drive and East McNichols Road. All of the equipment required for the job is carried in the panel truck, and comparative sizes can be judged from the men in the picture. Fig. 2 shows the same equipment at the same location on another day. On second occasion the equipment was loaded in a station wagon.

On this job a profile 610 ft. north and south was run. The seismograph report showed bedrock at the south end at 142 ft. below the surface, rising gradually to the north, until at the north end it was only 125 ft. below the surface. On the south end, the interpretation was that an 8-ft. layer of weathered material lay on the surface, with the remainder of the overburden material made up of clay, with one exception. At about 20 ft. below the surface at the south end, there was a layer of low-velocity material (sand?) which extended from that point about 200 ft. north, when it apparently pinched out. On the north end, the surface weathered layer was 18 ft. thick, with the remainder of the material to bedrock made up of the same type of clays as at the south end. Coring data verified these interpretations, checking within about 1 ft. on the distance to bedrock.

In Connecticut and Massachusetts, Rev. Daniel Linehan, S. J., of the Weston Observatory, Boston College, has been using refraction seismograph equipment in work for highway engineers. Some of the jobs have been: selection of best sites for bridge foundations, location of highways, and determination of amount and type of material to be excavated in proposed underpass locations. In areas where a well-defined water table exists, he has also been able to determine the depth necessary to drill to find a local supply of water.

Details on some of this work will be found in "Application of Geology and Seismology to Highway Location and Design in Massachusetts," Bulletin 13 of the Massachusetts Highway Research Board; also in "Seismic Reconnaissance for Ground Water Development," Vol. LXIII, No. 1, Journal of the New England Water Works Association.

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Can Reefs Be Found With the Seismograph?

E. D. ALCOCK, National Geophysical Co., Dallas.

THIS article affirmatively answers the question asked by the title. The various physical characteristics of bioherm type reefs are discussed and the manner in which they lend themselves to the seismic method of geophysical exploration.

Structure Forming Role of Reef Masses in West Central Texas

GERSON H. BRODIE, petroleum geologist, Abilene, Tex.

THE author develops a theory of draped sediments, rather than tectonic influences, which may prove of interest in oil search. Slides of maps and cross-sections through numerous fields in the West Central Texas area are discussed.

Seismic Exploration for Reefs Has No Unique Solution

D. RAY DOBYNS, Magnolia Petroleum Co., Dallas.

THIS paper gives a discussion of the problems encountered in conducting a seismic survey of Jameson field, Coke County, Texas; the methods used to obtain the best data, the method of computing and interpreting, and of records, time sections and maps.

Records obtained in the Snyder area of Scurry County are shown. Problems of velocity as related to the geologic section in this area are discussed; also records near high producers and near edge dry holes.

Vealmoor Field, Howard and Borden Counties, Texas—A Pennsylvanian Reef

S. J. TAYLOR and H. C. McCARVER, Seaboard Oil Co., Dallas.

VEALMOOR field of northern Howard County and southern Borden County produces from reef limestone of Upper Pennsylvanian age. The field was discovered as a result of seismic exploration. Subsurface and seismograph maps and cross-sections are presented showing the relationship of structure and sedimentation to the reef limestone.

Reflection Shooting in the North Snyder Area, Scurry County, Texas

NEAL CLAYTON, Republic Exploration Co., Tulsa.

DEVELOPMENT of the North Snyder area began in November 1948. Electriclog and seismic correlations at several points across the field are used to illustrate the problems involved. Specimen records show that at least in certain parts of the field, a reflection is obtained from the top of the reef. Effect of surface conditions on record quality are discussed and suggestions made for this type of exploration.

Case History of Henry Compton Block, Stephens County, Texas

D. B. CAMPBELL, JR., and G. H. HARRINGTON, JR., Independent Exploration Co., and R. J. DILGER, Fred Manning, Inc., Fort Worth.

THIS paper presents the geophysical and geological investigations leading to the discovery of oil production from a reef development under the Henry Compton block, a part of Stephens County Regular field in southwestern Stephens County, Texas. Seismic and subsurface maps, cross-sections, and production data are presented.

Gravity Survey Redwater Field, Alberta, Canada

JOHN BIBLE, Tideland Exploration Co., Houston.

THIS paper is a discussion of the gravity results of a survey of Redwater field. Topographic maps are shown; also subsurface map and gravity maps are discussed.

Progress Report on Devonian Reef Exploration in Canada

WENTWORTH J. TELLINGTON, Bear Oil Co., Edmonton, Alta.

PROBLEMS of surface and subsurface as related to seismic problems in Redwater and other areas of Canada are discussed.

Geologic Responsibility in Seismic Exploration

B. W. BEEBE, Anderson-Prichard Oil Corp., Oklahoma City.

PRIMARY responsibility in any exploration program with the object of locating commercial deposits of petroleum is and must be geological. Geologists as a group have failed to recognize and assume this responsibility insofar as geophysical prospecting methods are concerned.

The fundamental problem is the interpretation of physical observations in terms of earth science. The thesis of this paper is that the primary responsibility in exploration is geological and responsibility of the geophysical department or contractor is limited to three essentials:

1. To furnish the best instruments available to perform the specific task.
2. To furnish skilled, efficient, and experienced personnel to operate and maintain the equipment.
3. To furnish skilled and experienced technical and supervisory personnel to make necessary computations, preliminary interpretations, and working with the geologist, arrive at an integrated interpretation on which a recommendation can be based.

All other responsibility must be assumed by the geologist. It is mandatory that he have a thorough understanding of the principles, problems, procedure, and limitations of seismic exploration. It is not advocated that the geologist invade the field of the geophysicist, but if he is intelligently to appraise and use the results he must thoroughly understand their source and inherent strength and weakness. The need for this understanding is becoming more necessary as we are forced to prospect more marginal areas, areas where data are difficult to secure and interpret, and for prospects where the results are near the limit of accuracy.

The Airborne Ground-Elevation Profile Recorder

B. I. McCAFFREY, Photographic Survey Corp., Toronto.

PHOTOGRAPHIC SURVEY CORP. of Toronto has produced a number of airborne profile recorders for topographic survey. These are precision radar instruments which, tests have proven, are capable of measuring with the accuracy required for good surveying.

The technique employs an aircraft flying at constant-pressure height above sea level, while a radar altimeter measures the terrain clearance below. A recording-type ammeter replaces the familiar cathode ray tube of the usual radar set and records continuously the radar signals. A permanent scale drawing of the ground elevation profile along the flight track is thus obtained.

Correlation between profile and map position is accomplished by synchronized vertical photography. Compensation for deviations from a level datum is automatic and the resulting graphic record is a true copy of the topographic details.

Considerable field work has been carried out by P.S.C. and by the Canadian Government using these instruments, and practical experience has demonstrated their value as survey tools.

Examples of Aeromagnetic Surveys and Their Interpretations

JOSEPH A. SHARPE, Frost Geophysical Corp., Tulsa.

FOLLOWING a brief exhibit of the precision and freedom from surface effects displayed by aeromagnetic data, examples are given of aeromagnetic surveys over known structures in provinces in which the sedimentary section is thin, of moderate thickness, and of great thickness, and the interpretation of these examples is discussed.

A Single-Boat Seismograph System

L. S. PASLAY, Marine Instrument Co., Dallas.

A SEISMOGRAPH system specifically designed for a single-boat operation in offshore tideland areas is described. The use of pressure operated detector "streamers" permits continuous forward motion of the ship resulting in practical operation in any normal weather conditions. Geographical location of the actual shot points is provided by means of a radio Sonobuoy system of surveying. Operational data over a full year's time are given.

Application of Electric Logging To Ground-Water Exploration

P. H. JONES and T. B. BUFORD, Department of the Interior, Geological Survey, Baton Rouge.

A METHOD is described for determination of the quality of ground water in granular aquifers penetrated by rotary-drilled holes electrically logged. Conventional techniques of electric-log interpretation, to determine true bed resistivity from apparent

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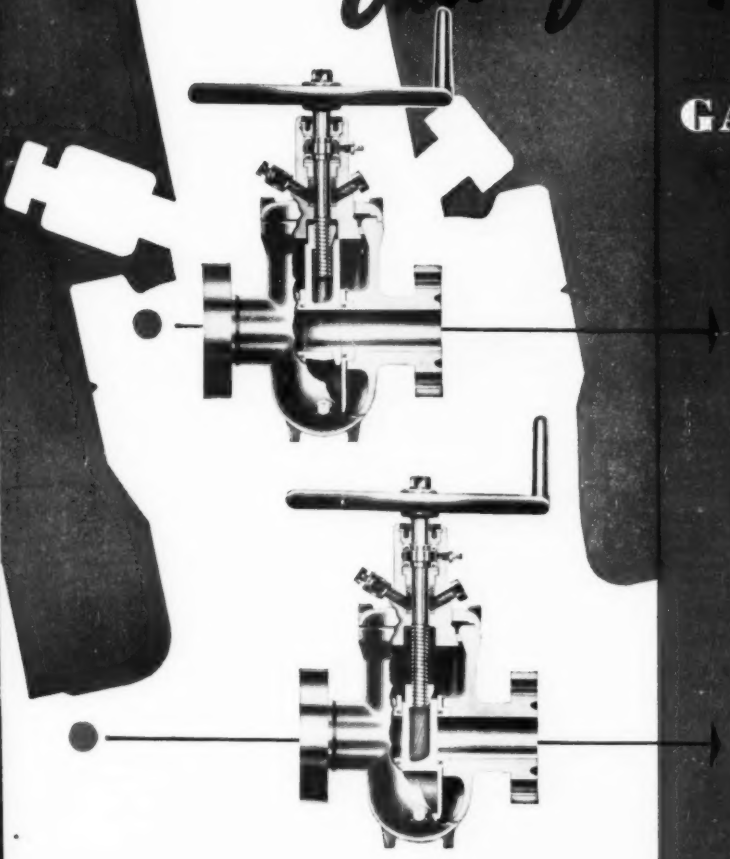

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The Expanding Gate gives a perfect seal against both seats when valve is open as well as closed.

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Pressure Seal Bonnet requires no flanges, studs or nuts. Greater pressure gives tighter seal. Self-adjusting to temperature changes.

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- Lubricant contained in entire body . . . no special lubricant required . . . seal does not depend on lubricant.
- Oversize bronze renewable seats.

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resistivity values, are briefly described; the physical characteristics of granular aquifers which influence bed resistivity are discussed, with special reference to the formula developed by Archie; and a method for converting water-resistivity values into hypothetical chemical analyses is explained.

The objective of the method is to narrow the limits of error in quality-of-water estimates based upon electric logs. Water-well contractors are fully aware of the risks attendant in making drill-stem tests in open hole, which is the method now employed to obtain representative samples of formation water. Packer failure results in contaminated sample; hole collapse may mean loss of drill stem, screen, and the hole. In the Gulf Coast where water-well tests range in depth from 100 to 3,000 ft., methods which will eliminate at least a part of the need for drill-stem tests deserve consideration.

The paper deals also with methods of determining formation porosity in situ, which is an important factor in salt-water-encroachment problems.

Public Relations in Geophysical Prospecting

A symposium prepared by the Fort Worth Geophysical Society.

A COMPREHENSIVE statement of existing problems in public relations as applied to geophysical exploration is enumerated. Several suggestions falling into two major classifications are offered to alleviate these existing problems. The first group includes suggestions to improve field operations from the standpoint of public relations while the second group includes suggestions to stimulate and encourage a broader general educational program of the public at large with reference to the value of geophysical operations in their towns and communities.

A.A.P.G.-S.E.G. DIGESTS

Papers presented at Pacific Coast joint A.A.P.G.-S.E.G. meeting at Los Angeles, November 17-18

A.A.P.G. Papers

Recent Exploratory Results In California

GRAHAM B. MOODY, Standard Oil Co. of California, San Francisco.

ANALYSIS of recent exploratory achievements in California indicates that those who have been prone to "view with alarm" the potentialities of California's oil resources have been overly pessimistic. This conclusion is supported by graphs, figures, quotations, and arguments.

Time of Oil and Gas Accumulation

A. I. LEVORSEN, Stanford University, Palo Alto.

AN idea of the time oil and gas accumulated into pools may be gained through: (1) a pool cannot form until after the trap has been formed. Several methods are in use for dating geologically the time the trap was formed and consequently setting the time before accumulation. (2) The capacity of a trap to contain oil and gas is roughly a function of the pressure in the reservoir. Pools full of oil and gas to the spill point have accumulated only under the increasing pressure which comes with burial. Both types of reasoning support the idea that in some pools at least, the accumulation was late in terms of the life of the reservoir rock — accumulation even taking place to the present time.

The P.V.T. relationship of gases may also be used to explain the time of regional migration of oil and gas within basins and provinces. Basins and other large geologic units have experienced numerous upsets of their P.V.T. relationships during their history. Tilting, faulting, folding, regional arching, erosion, and deposition all serve to upset the P.V.T. equilibrium. The development of a pressure gradient through such causes makes for the expansion and movement of gas toward the area of lower pressure in a manner similar to what we know exists when a well is drilled into a pool. The available energy may be very large. Local traps which existed prior to the regional movement would collect oil and gas into pools whereas local traps which formed after the regional movement would be barren.

Recent Development at Guijarral Hills

JOHN S. LOOFBOUROW, JR., Barnsdall Oil Co., Los Angeles.

GUIJARRAL HILLS oil field, located on the Coalinga anticline midway between Pleasant Valley and Kettleman Hills, was discovered by Barnsdall Oil Co. in September 1948, with production from the Leda sand. There have been 36 Leda sand wells completed in the field on a 20-acre spacing. Development has demonstrated that the accumulation is stratigraphic and only the updip or northwest limit of the field has been located. At present approximately 800 acres of Leda sand production have been proven.

In April 1949, a new zone was discoverd by Barnsdall's Allison A73-34-2, this a sand in the Basal Temblor approximately 500 ft. above the Leda sand. To date 11 wells have been completed from this zone on a 20-acre spacing. Indications are that the accumulation is stratigraphic. Approximate limits of production have been defined only to the southeast and at present about 360 acres are proven.

San Ardo, A Stratigraphic Analysis

THOMAS A. BALDWIN, Jergins Oil Co., San Ardo, Calif.

SAN ARDO oil field occurs in a stratigraphic trap at the up-dip shale edge of the Lombardi sand (Upper Miocene) During early Pleistocene time the water table of the field was warped synclinally. San Ardo field accumulated therefore during the Pliocene. Pliocene sediments of the area are described and termed the "San Ardo Group," including three partially interbedded and time equivalent facies, Pancho Rico, Etchegoin, and Paso Robles.

It is shown that the shore lines or buttressed edges of sands occurring in the Salinas area have not been favorable for accumulation. It is suggested that Pleistocene structures should be discounted during future exploration in the Paso Robles-Salinas area.

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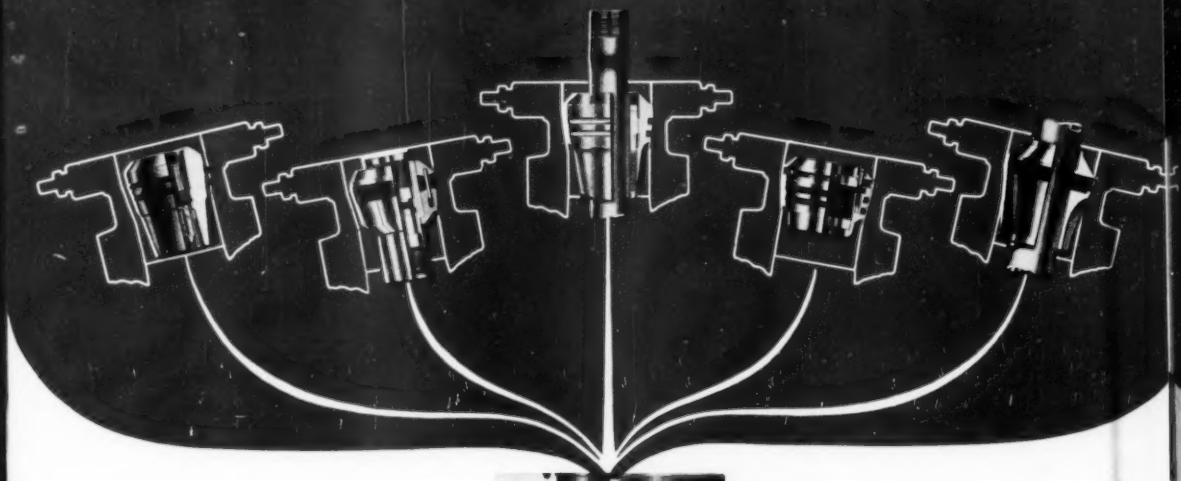

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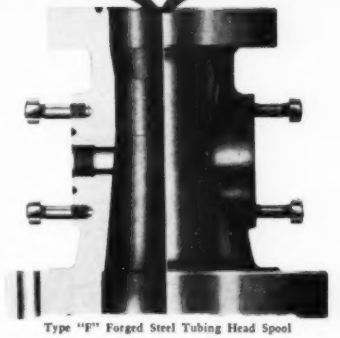

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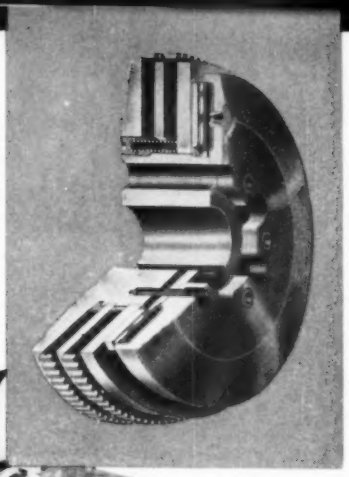

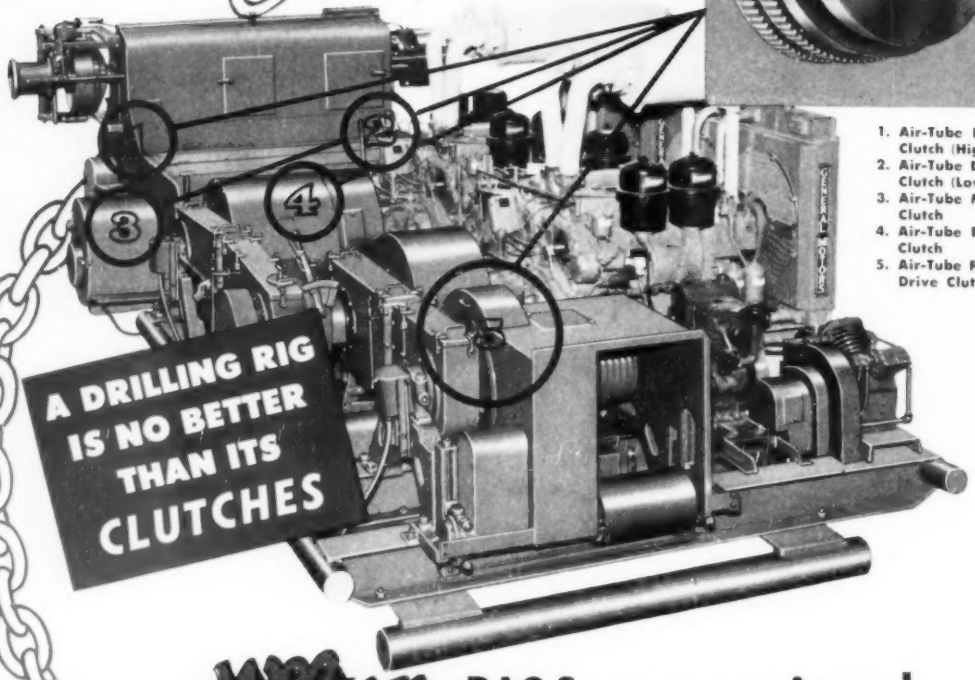

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Geology of Russell Ranch and South Cuyama Oil Fields, Cuyama Valley, California

ROLLIN ECKIS, Richfield Oil Corp., Los Angeles.

SINCE the discovery of high-gravity oil in the Cuyama Valley in June 1948, development and exploration has proceeded rapidly. As of October 15, 1949, operations resulted in discovery of two fields, and 151 completions with restricted daily production of 29,200 bbl. Thirteen development wells and six wildcats were currently drilling.

The two oil fields lie in the western part of the valley. Russell Ranch field development to date covers an area 4½ miles by ½ mile. Production is from two sand zones, Dibblee, the upper, and Colgrove, the lower; both of Lower Miocene age. The oil field occurs on a northeastward-dipping monocline against a large, normal fault, known as the Russell fault. The Dibblee sand lies at depths ranging from 2,800 to 3,200 ft. The Colgrove zone lies approximately 1,000 ft. below the top of the Dibblee.

South Cuyama field, discovered in May 1949 is 4 miles southeast of Russell Ranch field. Present development and productive outposts extend over an area 3 miles by 1½ miles. Production is from the Dibblee zone, at depths from 4,000 to 4,400 ft. Exploration has not yet been carried below this zone. Unlike Russell Ranch field, South Cuyama has a gas-cap area at the crest of the dome.

The Dibblee sand is a friable, well-sorted arkose, ranging from fine to coarse-grained. It is characterized by high porosity, high permeability, and high productive indices. Potentials in both fields range upward to several thousand barrels per day. The Colgrove sand is similar in character to the Dibblee and well potentials are comparable, though somewhat smaller due to the lesser thickness of sand. Both fields are being developed on a 10-acre spacing pattern, with duplicate wells where the Colgrove zone is productive.

Geology of Placerita Canyon Oil Field

ROBIN WILLIS, Hilldon Oil Co., Los Angeles.

PLACERITA CANYON oil field is developed in continental sands of Pico or Saugus age. Saturation occurs through an interval of 700 ft., with 150 to 400 ft. of productive sand, yielding 12° to 26°-gravity oil.

The structure is a monocline dipping west-northwest at about 25°, closed on the northeast by the San Gabriel fault, and on the south and east by minor faults. Other small faults divide the field into separate pools of varying gravity.

The proven area now covers about 560 acres, of which the intensively developed higher-gravity area (Confusion Hill) includes about 125 acres. The total reserve is estimated roughly at 30 million barrels.

Geology of North Sulphur Mountain Field, Ventura County

I. E. SCHWADE and SPENCER FINE, Richfield Oil Corp. Ventura, Calif.

THE discovery well, 35 Ojai fee, was drilled in 1912, and completed for 100 bbl. a day, 22.8° gravity, between 2,387-3,919 ft. In 1942, well No. 44 was drilled as a straight hole to a depth of 8,735 ft., and was completed in the interval 2,425-4,357 ft. However, as located well No. 44 encountered only a small amount of lower Mohnian and was completed largely in older beds.

Rediscovery of the field came in 1947 with the drilling of No. 45 for the purpose of determining the attitude of the fault, and character of the reservoir beneath this fault. From this information a program of directed holes was undertaken to maintain a high structural position beneath the fault and to encounter a greater amount of productive section. Development is now 1½ miles by ½ mile in width, and having 20 wells. Cumulative production is 496,000 bbl., average gravity 19°-20°.

Floor of the Los Angeles Basin

J. E. SCHOELLHAMER and A. O. WOODFORD, U. S. Geological Survey, Claremont

SURFACE of the Catalina schist west of the Inglewood-Signal Hill line shows great relief, from 1,100 ft. above sea level to 14,500 ft. below. Elongate basement ridges trend northwest beneath Torrance-Wilmington and El Segundo-Lawndale oil fields, somewhat less certainly beneath the Palos Verdes Hills, and considerably less certainly southeastward from Playa del Rey oil field.

At the northeast edge of the basin, from Pomona to Puente, the basement surface slopes southwestward about 800 ft. to the mile.

Central part of the Los Angeles Basin northeast of the Newport-Inglewood fault zone has a floor that is probably far beneath the depths of 10,000 to 12,000 ft. below sea level, reached by the deepest wells. Aeromagnetic strip surveys from Playa del Rey to Pasadena and from the Palos Verdes Hills to the San Jose Hills locally give promise of contributing data on the basement surface but at present are generally inconclusive. Types of basement rock beneath the central deep are unknown, though a discontinuity within the basement has been suggested by seismic evidence.

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Ocean Floor Investigations Along The Santa Barbara County Coast

WARREN C. THOMPSON, Scripps Institution of Oceanography, La Jolla, Calif.

FOR the increasing number of oil geologists who are studying the submerged shelves of Southern California a knowledge of where to look on the sea floor to find bedrock outcrops is highly desirable in saving exploration time and expense.

The submerged shelf between Point Conception and Santa Barbara is considered. Cross-sections of the shelf show that the Recent marine sediment or "overburden" which rests on the bedrock commonly forms a lens-shaped deposit. Isopach charts of overburden aid in conveying the nature of the sediment lens.

The extensive kelp beds along this coast are commonly considered to be a good criterion for the presence of bedrock outcrops. This is partly erroneous, since the kelp grows equally well in thick overburden of mud and fine sand. However, by observing plant density from aerial photography, it can be determined whether the algae is growing on bedrock or in thick sediment.

Some Observations on Geological Structures in Eastern Nevada

FRED L. HUMPHREY, Stanford University.

THE White Pine Range of east central Nevada consists of a central dome of Lower Paleozoic sedimentary rocks and a small granodiorite intrusive, surrounded by sedimentary rocks of Devonian and Carboniferous age. The dome is bounded by arcuate normal faults with maximum vertical displacements of from 15,000 to 18,000 ft. The evidence suggests that the dome has been pushed up, as a unit, into the younger rocks.

Principal structures within the Upper Paleozoic rocks are folds and thrust faults part of which occurred during Eocene time. Contained in these Upper Paleozoic rocks is a thick section of the Middle Mississippian White Pine formation, which, although there are rapid facies changes, often contains a considerable thickness of black carbonaceous shales. This formation is general throughout eastern Nevada and could well be a source rock for petroleum providing the structure and surrounding rocks furnish favorable reservoirs.

Other observed areas throughout eastern Nevada have structures generally similar to those within the White Pine district. That is, the rocks are often folded and the folds are often broken by thrust faults. The thrust faults vary from minor breaks with a few feet of displacement up to displacements of several or even tens of miles.

Presence of volcanic flows need not discourage oil exploration as these have often flowed many miles from the source. However, the intrusive rocks, including the dike feeders of lava flows, have altered and metamorphosed the surrounding rocks.

The Upper Paleozoic rocks are probably the only potential source rocks for petroleum in eastern Nevada, although the Ordovician graptolite shales of Central Nevada undoubtedly warrant examination, as well as the Triassic marine shales of southern Nevada.

Geology of West Slope of Temblor Range, Between Bitterwater Creek and Sandiego Creek

OTTO HACKEL and ROY W. TURNER, Independent Exploration Co., Bakersfield, Calif.

THE stratigraphy of the area studied is similar to that of the west side of the San Joaquin Valley. The Pliocene (?) Paso Robles formation unconformably overlaps Miocene to Cretaceous sediments. Upper to middle Miocene (Monterey group) shales and sands are generally lying on Eocene sandstones or are overturned under them. These Eocene (Canoas) sandstones are found in depositional or fault contact with the Cretaceous core of the Temblor Range.

Structurally the region is a strongly deformed wedge of sediments between the San Andreas fault zone on the west and the Cretaceous massif on the east. The apex of this wedge is to the northwest and deformation and overturning of the sediments increase in that direction. Anticlinal or fault closures are not readily discernible in the field. Wells in the area have encountered noncommercial oil sands of lower Miocene age. These oil sands or any other lower Miocene beds are not found in the outcrop, hence a strong possibility exists of finding stratigraphic accumulations of oil in the regionally high portions of the sedimentary wedge.

The Vaqueros Formation West Of Santa Barbara, California

EUGENE R. ORWIG, JR., General Petroleum Corp., Los Angeles.

A SUMMARY of data is submitted on the Vaqueros formation in the area between Gaviota Pass and Santa Barbara, California. A stratigraphic study was made with particular regard to variations in mass properties, heavy minerals and age.

Results of field observations and laboratory analysis have indicated maxima of thickness, sorting, permeability and porosity between Refugio and Bartlett canyons. Mean grain size was observed to have a decreasing trend from west to east. Heavy mineral assemblages invariably consist of titanite and black opaques, with a subordinate percentage of other resistant min-

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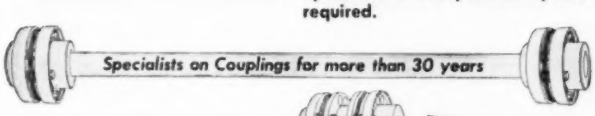

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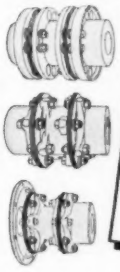

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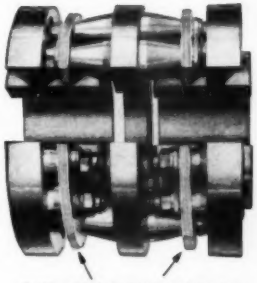

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erals. The underlying Sespe sands differ markedly in the dominance of epidote over titanite. The sparse megafossils found in this area were of little value in restricting the age of the Vaqueros. Foraminifera of the Uvigerinella sparsicostata fauna were collected from the base of the superjacent Rincon formation.

Geology of Northern Santa Rosa Island

ROBERT E. ANDERSON, Signal Oil & Gas Co., Los Angeles, LOWELL REDWINE and PAUL McGOVNEY, Honolulu Oil Corp., Santa Barbara and Bakersfield.

THE stratigraphy of the northern portion of Santa Rosa Island is somewhat similar to that of the Santa Barbara coastal district. These two areas represent, respectively, the southern and northern margins of the Ventura basin. The island area mapped offered a section from Pleistocene to Eocene, with Pliocene evidently absent. Formations recognized include marine terraces, Santa Margarita sandstone, Monterey shale, Rincon shale, Vaqueros sandstone, Sespe, Cozy Dell (?) shale, and Matilija (?) sandstone. An interesting time equivalence between the Vaqueros and Upper Sespe formations is indicated.

The Santa Rosa fault is the dominant structural feature of the island. It trends east-west and divides the island in half. A horizontal displacement of nearly 5 miles is indicated. Other significant but smaller faults are the Sandy Point, Garanon, and Arlington. Important folds are the Garanon, Tecolote, and Soledad anticlines and the West End and Becher's Bay synclines.

Five wells have been drilled and abandoned on the island and a sixth is now being drilled.

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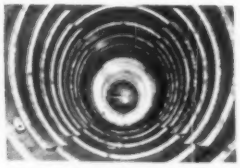

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S.E.G. Papers

Offshore Seismic Problems Affecting Geologic Evaluations

CURTIS H. JOHNSON, General Petroleum Corp., Los Angeles, and ROBERT B. GALESKI, Honolulu Oil Co., Los Angeles.

DURING 1948 and 1949 joint seismic operations were conducted offshore the coast of California by a group averaging 14 oil companies, employing two crews for a total of 13 crew-months. This joint effort was required by the California Division of Fish and Game to minimize damage to fish. This paper describes how these problems were handled and how they might better be handled in future work.

The paper begins with a short discussion of the applicability of various geophysical methods offshore the coast of California and continues with a short history of offshore exploration there and, less complete, in the Gulf of Mexico. It then takes up the following factors influencing the quantity and usability of offshore seismic data: bubble effect, multiple reflections from the ocean floor in shallow, intermediate and deep water, high angle "erratics," noise level, irregularities in the ocean floor, surveying, spread eccentricity, weather, traffic, shoreline population and damage to fish.

The tactics of California offshore exploration to facilitate geological interpretation are discussed under the following headings: Density and arrangement of lines, ties to shore, use of "L"-spreads to obtain strike and dip, and the interpretational use of diagnostic unconformities, projecting from shore, submarine coring, submarine topography and data from supplementary geophysical methods.

Reflected Energy Variations Resulting from Small Changes in Shot Hole and Spread Locations

CARL H. SAVIT, Western Geophysical Co., Los Angeles.

EXAMPLES of seismograms and cross-sections are presented to illustrate changes of considerable importance resulting from relatively minor displacements of shot holes and spreads. Records and cross sections are exhibited from continuous profiling lines which were shot from separate lines of shot holes on opposite sides of a single line of spreads as well as from lines which were shot from a single line of holes but which were recorded simultaneously on separate parallel spreads. A comparison of the results of conventional spread arrangements and of the parallel line or "H" spread technique as used in difficult areas is made.

Highlights of California Offshore Seismic Surveying

E. M. CURRY, Shell Oil Co., Los Angeles.

PAPER describes in a general way the operations and problems of marine seismic surveys along the California coast, with occasional brief comparison with marine surveying in the Gulf of Mexico.

Recent Developments in Geophysical Exploration Equipment

C. H. CARLISLE, Humble Oil & Refining Co., Houston.

A DISCUSSION of a series of slides showing several types of specialized geophysical exploration equipments and techniques used in present-day field operations, as well as some of the types of equipment and techniques formerly used.

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1949

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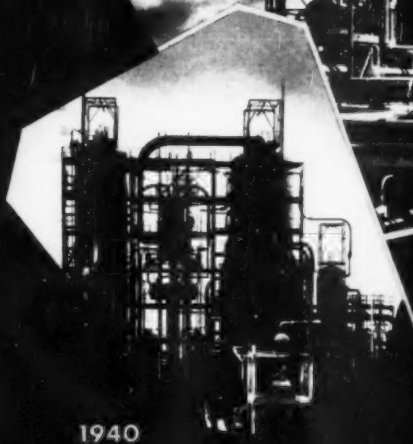

1940

30,000 bbls day

The construction of both of these 3-stage crude distillation units for the Humble Oil & Refining Company followed the same basic design. The design was "right" in 1940,—it is still "right" in 1949.

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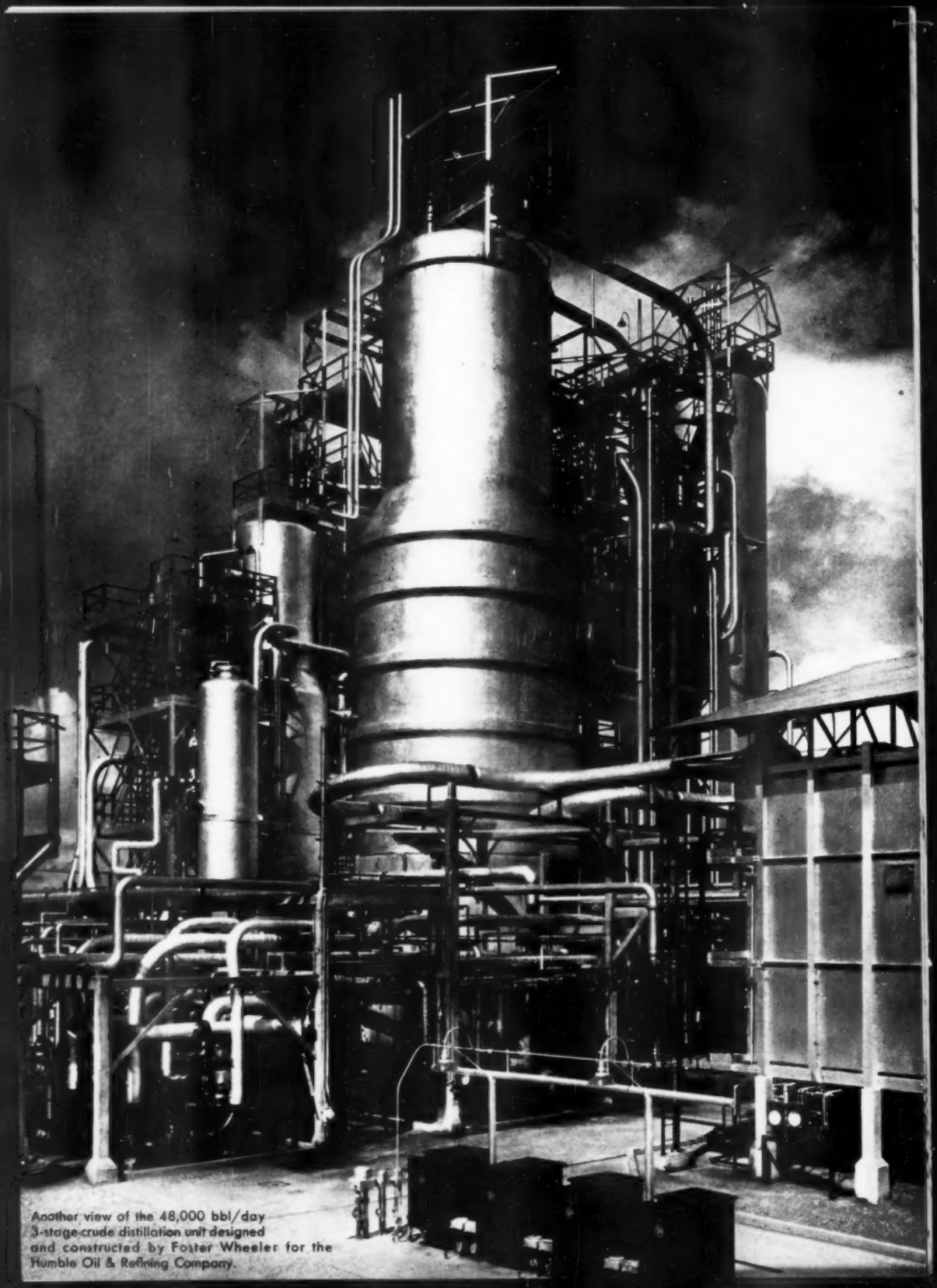

Another view of the 48,000 bbl/day 3-stage crude distillation unit designed and constructed by Foster Wheeler for the Humble Oil & Refining Company.

A.I.Ch.E. DIGESTS

Papers presented at the A.I.Ch.E. technical session at Galveston, October 21

Thermal Cracking Plant Capacity As Affected by Pressure and by Feed Stock Composition

JUDSON S. SWEARINGEN, Southwest Research Institute, RAY CLINT STIFF, and MAX SAMFIELD.

THE results from more than 200 runs in a laboratory unit are presented. These show that at the incipient coking point the crack per pass at optimum pressure is almost constant for short fractions of various boiling points in properly selected equipment. The length of the fraction is shown to be important past a range of 300° F. The optimum cracking pressure varies widely with boiling point of stock and is greatest for those of intermediate boiling point. Provision for continual preremoval of the liquid phase from the reaction zone is not important.

Evaluation of Chemicals for Corrosion Control in Cooling Water

M. C. FORBES, Celanese Corp. of America.

A TEST method has been devised for the evaluation of cooling water corrosion inhibitors under conditions similar to actual operating conditions. Sodium dichromate, two organic-chromium inhibitors and a phosphate-type inhibitor have been tested by this method and the results of the tests are presented. Suggestions for the operation of a complete testing program, from laboratory screening through full-scale equipment inspection are made.

Combating Corrosion in a Chemical Plant with Magnesium Anodes

OLIVER OSBORN, Texas Division, Dow Chemical Co.

THIS paper calls attention to the tremendous expenditures required by any chemical plant to combat corrosion, and describes a method for combating electrolytic corrosion, which has been highly successful. This method employs cathodic protection with magnesium anodes. Design considerations are briefly outlined, and descriptions are given of installations on steel sheet piling, condenser and heat-exchanger boxes, tanks and process vessels, internal surfaces of pipe lines, and so forth.

Data are presented to show that maintenance expenditures were reduced from one-sixteenth of their original values after magnesium was used to halt the normal process of corrosion.

Calculation of Minimum Reflux Ratio for Multicomponent Distillation

J. A. MAY, Dow Chemical Co., Freeport, Tex.

THIS paper presents a method for the precise calculation of minimum reflux ratio for multicomponent distillation based upon the resolution of the multicomponent mixture into an equivalent series of binary mixtures. Within the limitations of constant molal overflow and constant relative volatility, the method holds for all feed conditions and can be applied to all types of separations except those involving "split keys." While it does become somewhat time consuming for the general case, it is particularly adaptable to those situations wherein the feed is a saturated liquid or a saturated vapor ($q = 1$ or $q = 0$) and there are not components present lighter than the light key or else heavier than the heavy key.

Industrial Fractionating Tower Packing

R. C. SCOFIELD, Pan American Refining Co.

PERFORMANCE characteristics and motion-picture studies of a new form of oriented multilayer tower packing are presented. Commercial use in towers of up to 4 ft. in diameter is reported. The packing has both higher capacity and improved H.E.T.P. when compared to conventional

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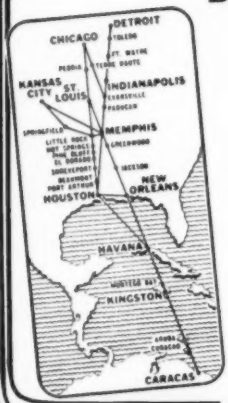

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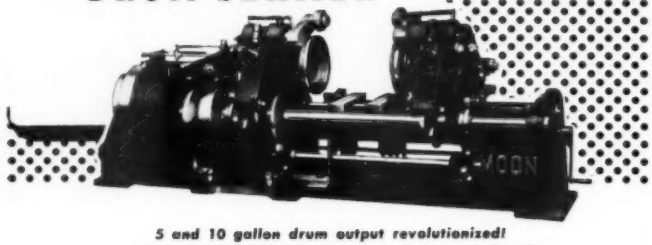

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bubble cap towers. For example, based on atmospheric pressure data, if the packing is substituted in an existing tower for 36 bubble cap trays on 1.5-ft. spacing, the resulting tower can give performance equivalent to over 100 bubble cap trays while operating at twice the maximum original loadings.

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Analysis of Fractured Limestone Cores

(Continued from page 123)

ter content of the sample is considered quite accurate.

In the conventional analysis the water content is apparently lower than by special analysis, and there is reason to believe that more time should be allowed for distillation of water from the sample. The water is read at an intermediate time in the case of sandstone samples in order to allow for combined water or water of crystallization, but apparently in the case of dolomitic formation the water is held in the fine capillaries in free rather than in combined form, and the reason the water is slow in coming over during the distillation is that the permeability of the matrix is so low.

The high measured gas bulk in conventional analysis seems to be the most important source of discrepancy. It should be realized that in the low-porosity material involved we are stretching the limits of accuracy of this measurement. The reason for the high gas bulk probably lies largely in the fact that there is a surface effect and that the mercury conforms more closely to the grains when pressure is applied. This effect causes a greater percentage error when the total pore space is low.

Acknowledgment

Acknowledgment is made to the companies who have kindly given permission to use their data herein, and to H. W. Brennan, Jr., Lloyd N. Johnson, and W. R. Bailey, who have assisted in the preparation of this paper.

BOOKS

MAP OF THE BEREA SAND OF NORTHERN OHIO. By Wallace de Witt, Jr. Published by U.S.G.S., Washington, D. C. 50 cents.

This map is a revision of Preliminary map 39 to which have been added the data from more than 5,000 well logs that were obtained after the publication of the first map. It shows the extent and thickness of the Berea sand, and is on a scale of 3 miles equals 1 in. Map measures 41 by 52 in.

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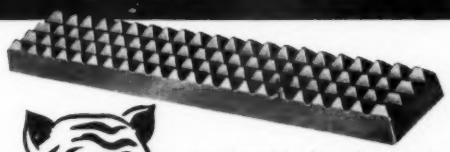

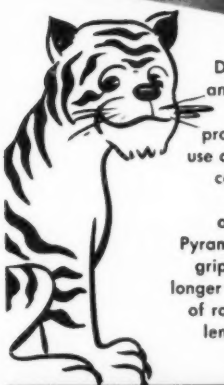

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Reducing Pour Point Of Fuel Oils

In blending 60 per cent of fuel oil with 40 per cent of reduced crude oil for the purpose of making No. 5 fuel oil, we obtained a cold test that to us was baffling. The cracked residuum had a pour point of 50° F., the reduced crude oil 70° F., and our blend a pour point of zero °F. Can you explain this phenomenon?—A. H. M.

This phenomenon cannot be explained with any real satisfaction. However, it is not uncommon, and in fact one Arkansas refinery has for years had a thriving business of supplying his particular residuum to jobbers who prize it highly as a stock for reducing the pour point of blends. Very many refiners use small amounts of thermally cracked residuum in their distillate fuel oils for reducing the pour point. Although percentages of 1 or 2 are quite effective, this is enough to discolor the distillate. Thus, such a practice has not, to our knowledge, been used in reducing the pour points of distillate diesel fuels. As one illustration, when a minus 20° F. pour point catalytic cracked distillate was treated with a plus 55° F. pour point thermally cracked residual fuel oil (9.3 A.P.I.), the following pour points were obtained (Master's Thesis by Claude M. Murray, Jr., University of Tulsa, 1947, "Pour Point Depression of Diesel Fuels"):

Per cent cracked fuel in blend	Pour point of blend
0	−20
5	−25
10	−30
20	−36
30	−38
40	−37
60	−21
80	+28
100	+55

Similarly Murray shows for a zero pour point straightrun diesel fuel, the following pour points upon the addition of cracked residuum (9.3 A.P.I.):

Per cent residuum	Pour point (° F.)
0	0
1.0	−3
2.5	−10
5.0	−12
10.0	−16
20.0	−24

The method has also been used to a small degree in blending lubricating oils. Small amounts of cracked residuum have been added to light neutral oils. Obviously, discoloration occurs and this limits the additions to very small amounts. Likewise, small amounts of cylinder stock have been added to neutral oils.

As for an explanation, we can only state that asphaltenes (material insoluble in petroleum ether but soluble in benzol) appear to be the agents that are most effective in reducing the pour point (Kalichevsky, V. A., Fuels for High-Speed Diesels, Pet. Refiner, April 1945, p. 89). There is some indication that vigorous mixing during cooling of the blend makes the application of the asphaltenes more effective.

Likewise, the Murray thesis mentioned above indicates that asphaltenes are much more effective as pour-point reducers if they are dissolved in benzol or methyl ethyl ketone before they are added to the oil. This is another way of obtaining intimate dispersion. These facts indicate that the action is a physical one whereby the asphaltenes attach themselves to the surface of the tiny incipient wax crystals inhibiting growth of the crystals. Thus, perhaps the wax separates out, but in such a finely divided form that interlocking does not occur and the mixture can flow. This theory is somewhat fortified by the phenomenon of "pour point reversion" which has gained attention in recent years. "Reversion" refers to the jellying that lubricating oils which contain pour-point depressions sometimes undergo. After long standing, they cannot be poured, and nevertheless, after shaking them vigorously the pour point is again lowered. According to the general theory outlined above, such oils at first contain finely divided wax-inhibited crystals. Upon long standing they finally agglomerate to some extent into a somewhat continuous wax structure throughout the entire oil. However, the wax structure is not entirely continuous because of the inhibitor (asphaltenes or paraflow) and hence upon shaking or stirring, the wax structure breaks apart at the interfaces of adjacent tiny crystals allowing fluid behavior again. The above theory has not been (to our knowledge) suggested elsewhere and hence it should be employed only as a help in interpreting the situation.

Octane Properties of Poly Gasoline

What are commonly accepted values of the octane number, etc., of poly gasoline?—A. R. F. M.

Table 1 is based upon the following sources:

1. Chambers and Purcell, Poly Plant Converts to Peace, The Oil and Gas Journal, May 18, 1946, p. 118.
2. Egloff, G., Polymer Gasoline, Ind. Eng. Chem., 28, 1461 (1936).
3. Weinert and Egloff, Catalytic Polymerization . . ., Pet. Processing, June 1948, p. 585.
4. Nelson, W. L., Petroleum Refinery Engineering, 3rd Ed., p. 647 (McGraw-Hill Book Co., 1949).
5. Steffins et al, Correlation of Operating Variables in Catalytic Polymerization, Chem. Eng. Progress, 45, 269 (1949).
6. Nelson, W. L., Research Versus Motor Octane Number, The Oil and Gas Journal, May 26, 1949, p. 93.
7. Heath and Hicks, Octane Number Blending Characteristics of Motor Gasoline Components, A.C.S. meeting, Chicago, April 1948.
8. Yabroff and Nixon, Octane Number and Lead Susceptibility, The Oil and Gas Journal, February 22, 1940, p. 74.

TABLE 1—APPROXIMATE OCTANE NUMBER CHARACTERISTICS OF POLY GASOLINES

	Thermal or unitary		Catalytic (phosphoric acid)	
Property—	High pressure	High octane	Regular	Selective
Research method:				
Clear			95-98	
1 cc. TEL			96-117	
3 cc. TEL			98-113	
Blending (10-20%) in straightrun			101-106	
Motor method:				
Clear	73-82	94	75-84*	84-100
1 cc. TEL			79-85	
2 cc. TEL			80-86	
3 cc. TEL			81-87	
Blending (5-20%):				
On straightrun—clear	96-112	99-102	110-120	138-152†
On straightrun—1 cc.			107-116	
On straightrun—3 cc.			105-113	
On cracked			89-100	
On catalytic—clear			86-88	
On catalytic—1 cc.			93-102	

*Yabroff and Walters report one sample of 70 octane number. †Data are old and may not be reliable because Egloff and Weinert show generally lower values.

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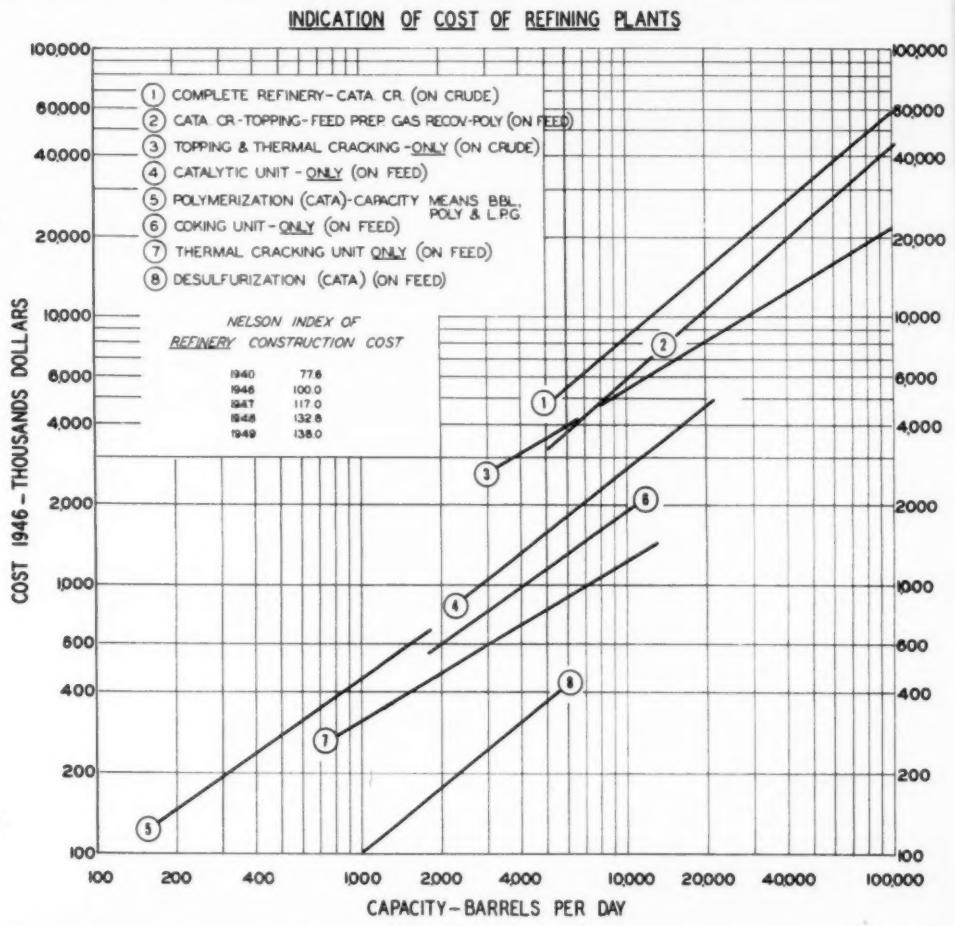
Cost-imating

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

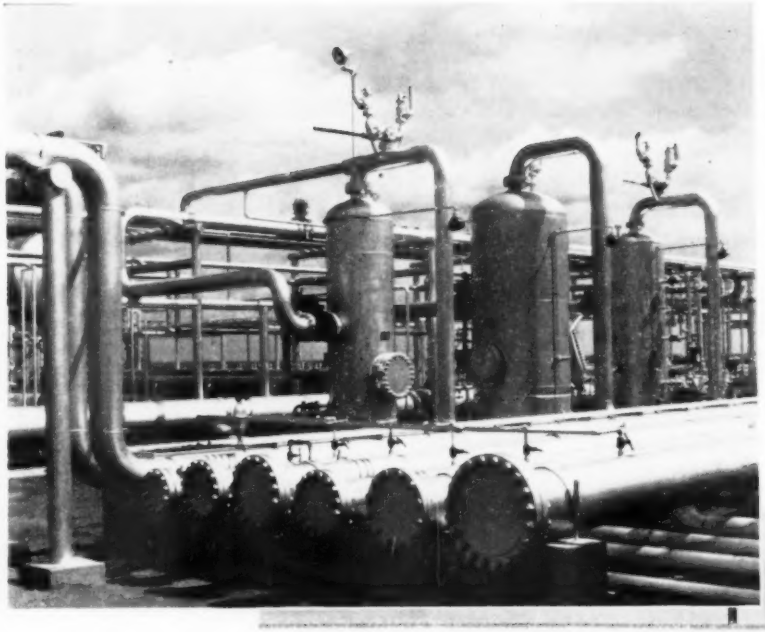
Over-all Plant Costs—Cracking

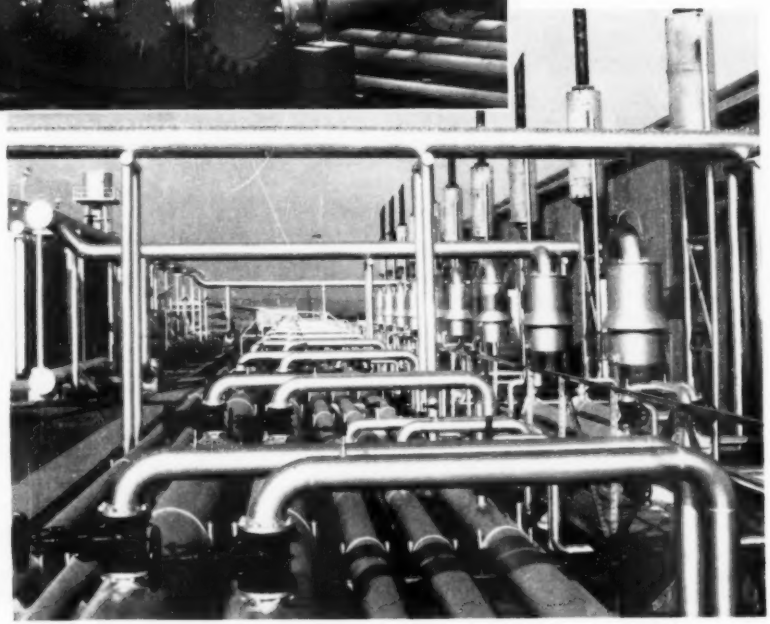
(Approximate)

VARIATIONS in plant processing are so great that over-all plant or processing unit costs cannot be exact. The data (over 70 plants) underlying the curves shown here ranged from about 56 per cent of the values shown to even 67 per cent higher than the values shown, although most of the costs fell within plus or minus 20 per cent. The costs can be converted to 1949 by the index shown on the chart. Many of the costs came from the author's files but the several articles by R. B. Tuttle in The Oil and Gas Journal were used, and the monthly "Refinery and Other Plant Construction Costs" appearing in the Petroleum Refiner were also employed.



No. 58 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa





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THE OIL AND GAS JOURNAL
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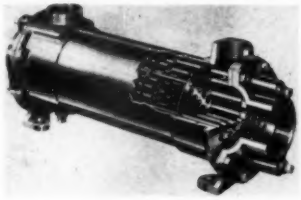
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

by Dan B. Miller

26 STANDARDIZED STAINLESS-STEEL EXCHANGER. Identical in design and capacities to the well-known Ross Type BCF exchangers which are all-copper and copper alloys, the new model, Type SSCF, utilizes stainless steel to avoid contamination of fluids or corrosion by fluids. The SSCF series incorporates all recent advancements in thermal engineering, and is offered in a complete range of sizes tested to 450 psi. to withstand most strenuous usage. While Type 316 stainless steel is standard, SSCF exchangers can be made also from any of the other well-known types of stainless steel. *Ross Heater & Manufacturing Co., Inc.*



IT'S NEW CHECK IT

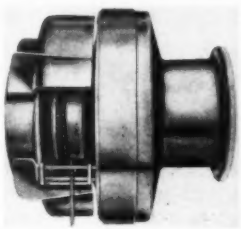
27 "Y" TYPE STRAINER. Primarily designed for the protection of steam traps, reducing valves, and temperature controls, this new strainer is recommended for removing impurities such as lint, scale, dirt, or sand from steam, air, water, or gas. Sizes range from ¼ to 2 in. for steam pressures to 250 psi., or cold pressures to 400 psi. Special features include: monel screen; an extra-heavy semisteel body with self-centering screen guides to prevent crushing; a screen that is easily removed for cleaning; and new gripping lugs on inlet and outlet bosses which permit installation with any type of wrench. Cast-steel strainers are available for steam pressures to 600 psi., in sizes from ¼ to 4 in. *Strong, Carlisle & Hammond Co.*

IT'S NEW CHECK IT

28 NEW JET BACKOFF TOOL facilitates unscrewing tool joints or couplings in drill pipe or tubing. Pipe to be backed off is first normalized in regard to weight by applying upward strain on pipe. The tool, complete with collar-finder fingers, is then run on an electric cable inside the drill pipe or tubing to a point adjacent to joint to be unscrewed. A sonic device in service truck informs the operator when they snap into a collar recess or groove in the center of tool joint. The jet backoff tool is then discharged in the joint, the electric conductor cable pulled from the hole, and the pipe unscrewed. With this tool all shock of the detonation is confined to one joint, it is unnecessary to apply torque before discharging the jet, and as many joints as desired may be loosened before backing off the pipe. The tool is made in two sizes, 2⅛ and 1¾-in. o.d. *McCullough Tool Co.*

IT'S NEW CHECK IT

29 FRICTIONAIR 24 breakout and spinning cathead is designed to provide smooth, shockless engagement and instant release. Clutch can be engaged only when air pressure is applied. Clutch plates are separated instantly by strong spring pressure. A quick release valve and large air passage insure instant release of air pressure. Large double-disk clutch has four friction linings with a total area of 640 sq. in. This air-operated joint breaker and spinner offers ample power for all joint-breaking jobs. Drum guard is provided to prevent fouling of line. *Modernized Oil Equipment Co., Inc.*

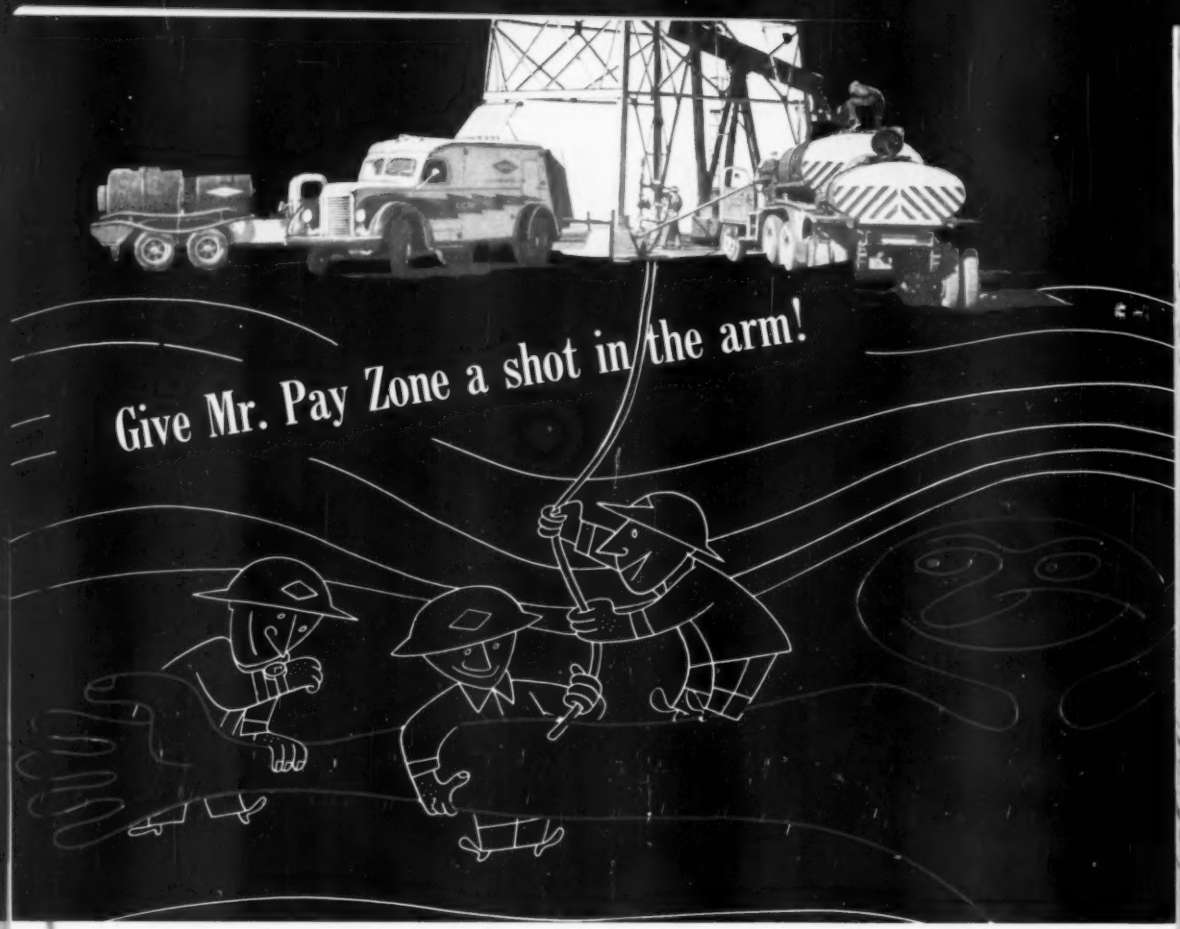


IT'S NEW CHECK IT

30 WESTERN SAFETY BARREL STAND is a device for holding 55-gal. barrels in such a manner that

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

Keep Informed. Save Time. Tear Out Card. Check It. Mail It.



Dowell Selective Acidizing puts the acid where you want it!

To get more oil from your wells, acid treatments should be directed accurately into selected zones. Look to Dowell for this service—*selective acidizing*, using the Electric Pilot.

Drawing on experience gained in acidizing thousands of wells, Dowell engineers work with you, correlating an Electric Pilot permeability survey with other well data, to determine the zones which should respond to treatment. Then, with the aid of the Electric Pilot, they *acidize just those zones*. For example: A north Texas well was producing $\frac{1}{2}$ barrel of oil per hour and had a gas-oil ratio of 20,000 to 1. After selective acidizing, the well produced 50 barrels of oil per hour, and the gas-oil ratio was reduced to 500 to 1!

Selective acidizing is advantageous in most old wells, particularly those with residual oil to be recovered from tight sections; those with high gas-oil ratios, intermediate water zones or leaking casing seats; and those plugged back from bottom water or deepened to new pay zones. It is of value for new wells with saturated zones of varying permeability or those with a change of formations within the open hole.

Ask for your copy of the booklet describing all the Dowell Electric Pilot Services.

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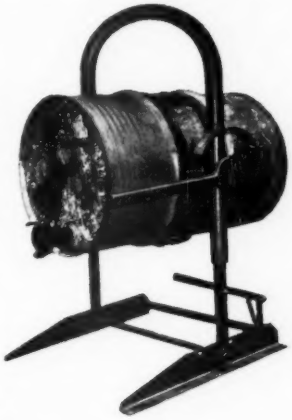
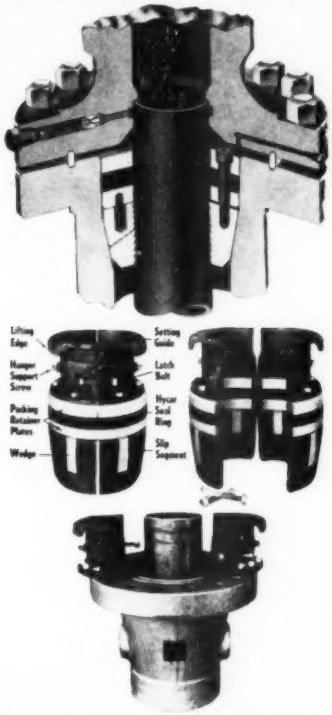
they easily can be tilted for dispensing the contents. The barrel is suspended by a band around its center in an inverted U frame which is pivoted to the base of the stand. It can be latched in either horizontal, vertical or 45° angle positions by means of a tilting lever on one of the U frame legs. To put a barrel in the stand, the barrel is placed immediately in front of it, and the U frame lowered until the band is in position to be locked around the barrel. When this has been done, the U frame is raised to a horizontal position, where it locks automatically by the locking arm extending from the base. *Henry H. Paris Distributor, Inc.*



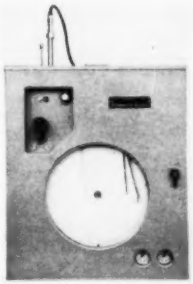
IT'S NEW CHECK IT

31 CAMERON TYPE "A" CASING HANGER offers a number of advantages. It sets and seals automatically through blowout preventers and effects a seal of the annular space when the pipe is hung. The hinged hanger assembly can be latched around pipe at any point, therefore being applicable to both upset end and regular casing. Setting guide insures positive alignment and facilitates dropping assembly to seat in casing head. It offers more positive slip action due to low coefficient of friction between wedges and casing head. No special casing head is required, for the Type "A" is fully interchangeable in all Cameron heads. *Cameron Iron Works, Inc.*



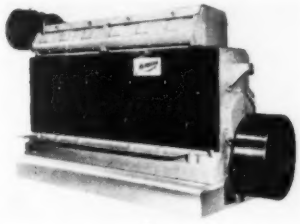
IT'S NEW CHECK IT

32 ROBOMATIC REFRACTOMETER controls flow of industrial process streams by refractive index instantaneously, continuously and graphically records the results 24 hours a day. The apparatus operates directly from the stream, and there is an instant response to any product change. It provides a continuous and accurate record of the product flowing through the pipe. The instrument comprises a dipping refractometer, a constant temperature bath with a range from 35° to 150° F., accurate within 0.02°, a recorder actuated by a photoelectric cell and amplifier, and an air-operated controller. *Precision Scientific Co.*



IT'S NEW CHECK IT

33 MIRRLEES "J" TYPE DIESEL ENGINE is a high power-weight ratio engine designed for drilling-rig application. Short stroke and large bore permit construction to withstand high pressures and high rotative speeds with moderate piston speeds. Built in 3, 4, 5, 6, and 8-cylinder range "in-line" and in 8, 12, and 16 cylinders in V form. Available from 160 b.hp. at 600 r.p.m. to 1,800 b.hp. at 900 r.p.m. All "J" type engines are totally enclosed. There are no moving parts outside the covers and no external hand lubrication is required. Gear drive is provided throughout. Engine is entirely pressure lubricated and is designed for dry or wet sump alternatives. *British Oilfield Equipment Co., Ltd.*

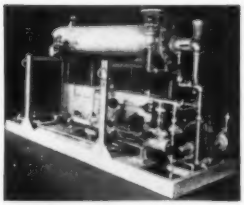


IT'S NEW CHECK IT

34 OB HEVYWATE is a pure ground barytes weighting material. The color is white and it assays between 4.26 and 4.41 specific gravity, which leaves practically no room for the presence of foreign matter. It is ground 99 per cent through 325 mesh. No flotation. It contains no water solubles, and no contaminants to adversely affect drilling muds to which it is added. It is sacked 100 lb. net. *Oil Base, Inc.*

IT'S NEW CHECK IT

35 HYDROGEN-SULFIDE REMOVAL UNIT is a self-contained skid-mounted, portable, air-cooled unit for the purification of natural gas for compressor-station fuel gas or pipeline delivery. It is applicable to individual sour-gas wells and employs monoethanolamine as regenerative liquid purification medium. Simple in operation, the unit requires a minimum of field assembly, is entirely automatic, and requires little attention and no utilities. *Graff Engineering & Equipment Co.*

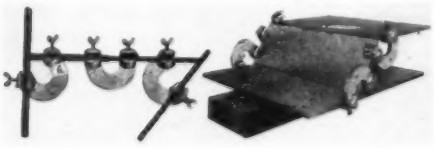


IT'S NEW CHECK IT

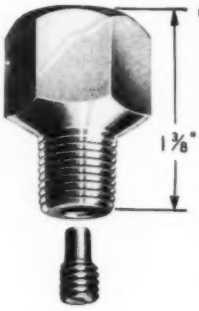
36 CABLE LOAD LIMIT SWITCH is an instrument for operating an electric switch when the cable tension reaches a predetermined value. It may be applied to any wire cable from ¼ to ¾ in. in diameter without cutting or removing the cable. An alloy-steel heat-treated rectangular beam is clamped on the cable, and an offset is placed in the cable which deflects the beam so that loading will operate the switch. In order to set the switch at any predetermined load, an adjusting screw is provided; and also an auxiliary stud is provided for sealing the switch when used as a limiting device by safety departments or crane engineers. *Martin-Decker Corp.*

IT'S NEW CHECK IT

37 PROTRACTOR WELDING CLAMP is a new tool that was created primarily to hold plates, bars, and tubing, while the parts are being united by welding, brazing, or soldering. Piping systems and weldments can be completely installed and assembled before the first weld is applied. Special fixtures and templates can be eliminated in a high percentage of cases and considerable labor is saved. *Bernard Welding Equipment Co.*



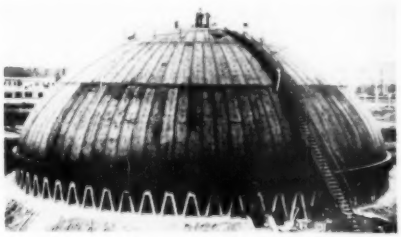
IT'S NEW CHECK IT



38 STAINLESS-STEEL CARTRIDGE SNUBBER. Made with a cartridge of compressed powdered stainless steel and a steel body, it is a simple and effective throttling device for pressure gages to reduce or eliminate pulsations of the gage pointer. No adjustments are needed. Specific porosity of cartridge makes it effective for required service; air, gas, water, steam, or oil. Available for all pressures up to 10,000 lb. *Helicoid Gage Division, American Chain & Cable Co., Inc.*

IT'S NEW CHECK IT

39 CAQUOT TANKS have no internal structure or moving roofs and may be delivered in sizes up to



180,000 bbl. and pressures up to 75 psi., without using plates in thicknesses that require preforming at the mill. They are constructed according to A.P.I. specifications. Design assures speed and economy in erection. All construction is by electric welding. Tank working pressure is determined by the pressure of the structure's own weight and the general design characteristics which offset the internal pressures. Particularly desirable for storage of highly volatile products and for products having a high density. Full line of tank accessories available for each size of tank. *Caquot Tank Corp.*

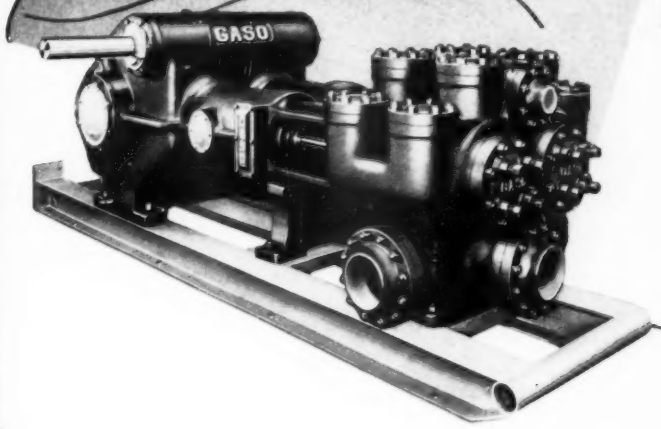
IT'S NEW CHECK IT

40 NAPKO PHOSPREME is a bare metal wash primer for use in obtaining permanent tight adhesion of all types of finish coats applied over steel, aluminum, copper, bronze, zinc, galvanized iron, magnesium, and an infinite number of normally difficult-to-coat metals and alloys. An inhibited vinyl butyral wash primer, Phospreme is an acid-activated film former. Phospreme may be sprayed, brushed, swabbed, or roller-coated. Phospreme air dries very rapidly and, under ideal conditions, may be recoated in 15-30 minutes. One gallon of reduced Phospreme will coat approximately 200 sq. ft. of metal surface at an approximate cost of from 1½ to 2 cents per square foot. *Napko Paint & Varnish Works.*

IT'S NEW CHECK IT

GASO PUMPS

In tune with the times



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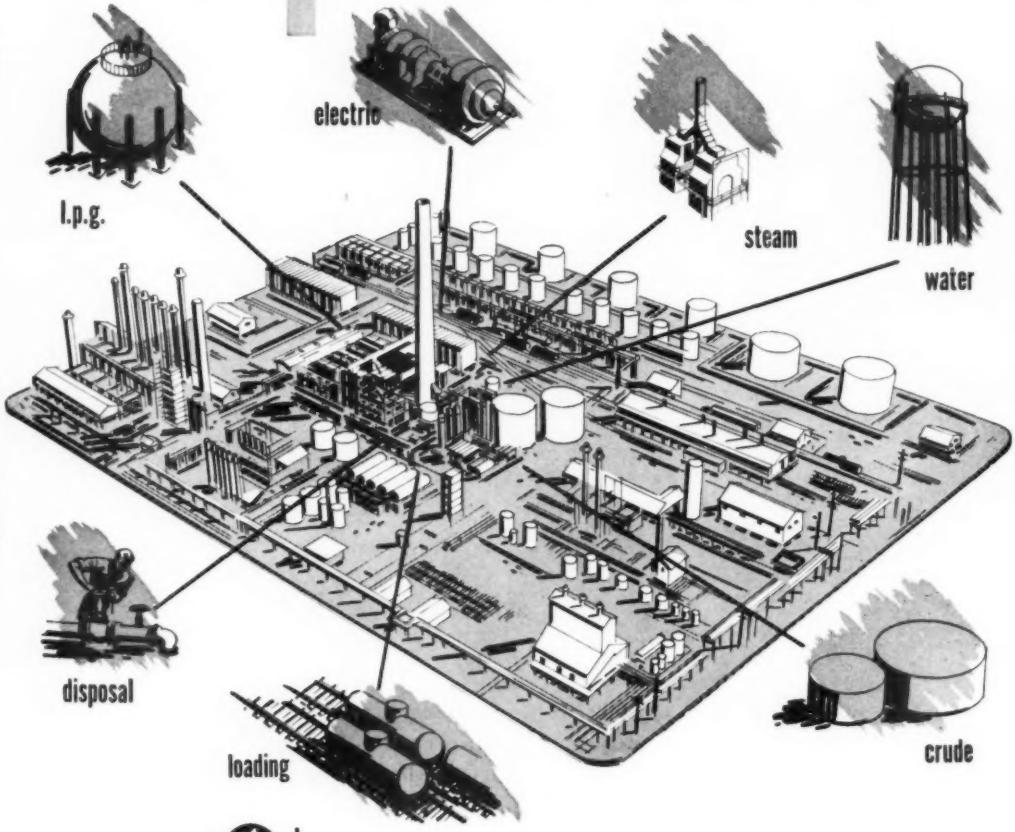

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REFINING

Dry-Cargo-Vessel Tanks Used to Ship Lube Oils

ONE Mid-Continent area refiner is now using deep tanks in dry-cargo vessels to ship lube oils to the East Coast, which is resulting in big savings over existing freight rates.

Mid-Continent Petroleum Corp. will benefit from a substantial saving in transportation costs, according to Robert W. McDowell, president, as a result of an arrangement made to use dry-cargo ships from Mobile, Ala., to Baltimore, New York City, and Philadelphia.

The Tulsa firm, one of the largest manufacturers of lubricating oils in the Mid-Continent area, previously had been making its shipments to the East Coast by railroad tank cars since beginning of World War II, due to lack of tankers equipped to handle lubes.

Tankers Not Adequate

Although there are plenty of tankers to carry crude oil and other large shipments of petroleum products, most have large compartments which are not suitable to handle the quantity of lube oils usually moved. Mid-Continent Petroleum Corp. shipments to the East will average around 250,000 gal. every 2 or 3 weeks.

By the arrangement with a shipping concern, deep tanks in several dry-cargo vessels, generally used to carry water, have been converted to carry lube oils in bulk. The tanks have been equipped with lines, steam coils, and other equipment necessary to handling the oil and keeping it in good condition. Size of shipments depends on how many tanks each vessel can convert, and how many vessels convert the deep tanks to carry oils, McDowell said. Each tank can hold about 100,000 gal. of lube oils, and the arrangement also permits shipping several different grades of lube oil at one time, in bulk.

No New Markets

"This new arrangement does not mean a new market or new customers for our products," McDowell said. "Railroad freight rates have risen so high we simply looked around for a way to make the shipments at less cost, and made the arrangements for converting deep tanks in dry-cargo vessels with the Mobile concern." (Cost of shipping 250,000 gal. of lube oil to Philadelphia by rail at the present rate would be about $22,000.)

McDowell said that the port authority at Mobile has cooperated in establishment of dock facilities, tankage at dock side, and that such facilities are being constructed at eastern ports.

Freedom-Valvoline Puts New Filter Plant in Operation

A new filter plant has been placed in operation at Freedom-Valvoline Oil Co.'s Freedom, Pa., refinery. The new installation cost approximately $750,000 and will more than double the filtering capacity at the refinery and permit greatly expanded production of waxes, petrolatums, and other specialties, in addition to increased output of high-grade oils, greases, and other petroleum products. The crude-oil charge capacity of the refinery is 4,000 bbl. daily.

The new filter plant is part of an expansion program undertaken 3 years ago to double the firm's production of Pennsylvania Grade lubricants. Designed by Freedom-Valvoline engineers, the new filter plant incorporates many new ideas not previously in use, according to B. L. Heath, vice president in charge of manufacturing. Construction was begun in February under supervision of Joseph L. Blount, general superintendent at the refinery, and K. W. Nichols, superintendent of filtering processes.

Other parts of the expansion program which have been completed include increased distillation and dewaxing capacity, new canning machinery, expanded shipping facilities at the packing plant, additional storage tanks, new warehouses, and a maintenance garage.

Industrial Peace to Spur Lube-Oil Demand—Wenzel

W. C. Wenzel, executive manager, Pennsylvania Grade Crude Oil Association, told the Ohio Oil and Gas Association at Columbus last week that the end of the steel strike forecasts a period of industrial tranquility that will expand demand for lubricating oils.

Wenzel said that the prospect of increased industrial activity and continued high production by the automotive industry are favorable domestic factors which offset, to a considerable extent, the uncertainty in the export market caused by recent currency devaluations.

He added that other uncertainties

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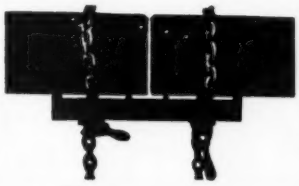

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For — Clear or opaque fluids

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PROCESS CONTROL INSTRUMENTS

in the export field included dollar shortages and plans to expand foreign lubricating-oil plants with U. S. funds furnished through Economic Cooperation Administration.

New Refining Booklet Is Published by Mines Bureau

A bibliography of available information on investment and operating costs for processes in general use in the petroleum refining and chemical industries has been released by the U. S. Bureau of Mines. The publication was prepared as part of the bureau's oil-shale research and development program and represents the results of work done by the bureau under a cooperative agreement with the University of Wyoming.

Designed to assist plant managers in estimating equipment and operating costs of specific petroleum refining and chemical processes, the reference work provides a convenient index to scientific information appearing in trade and professional magazines over the past 18 years.

Shell Opens Expanded Plant Terminal at Tacoma, Wash.

A new waterfront terminal has been completed by Shell Oil Co. at Tacoma, Wash., and it will be in full operation before the month is over, according to a company announcement. Completion marks another step in the firm's $6,000,000 West Coast expansion program.

To keep the present monthly volume of more than 2,000,000 gal. of petroleum flowing from the Tacoma terminal into an area including a large portion of southern Washington, all of Shell's receiving, packaging, and distributing facilities in Tacoma have been consolidated at the new plant.

New Automatic-Transmission Fluid Introduced by Gulf

A new branded automatic-transmission fluid has been placed on the market by Gulf Oil Corp. and is being introduced to enable dealers and company-operated stations to offer a complete lubrication service to owners of cars having automatic transmissions.

Named Gulf Automatic Transmission Fluid, Type A, the new product will make its appearance in local markets as rapidly as an intensive dealer training program in automatic transmission lubrication service will permit. The course is currently being offered to all dealers who plan to market the product, and they will receive a qualifying certificate on its completion.

Two or more lubrication engineers from each of Gulf's domestic sales divisions attended a recent 3-day session of this unique training program in Pittsburgh.

Pennsylvania Railroad to Buy 226 New Diesel Engines

Pennsylvania Railroad has placed orders for 226 diesel-electric locomotives, costing an estimated $38,000,000, the company announced last week. This brings the cost of the railroad's postwar program of equipment and service improvement to more than $300,000,000.

Deliveries of the new diesel-electrics are to start in January and will be "substantially" completed by the end of August 1950. The road now has 594 diesel-electric locomotives in service.

A recent report prepared by the research committee of Eastern Railroad Presidents Conference shows that the rise of the diesel engine for both freight and passenger service has been tremendous. By 1941 diesel locomotives hauled only 0.22 per cent of freight traffic, but by 1948 21.27 per cent was being hauled by the oil-burning engines.

On April 1 of this year 97 per cent of the 1,322 locomotives on order were diesel, the report disclosed.

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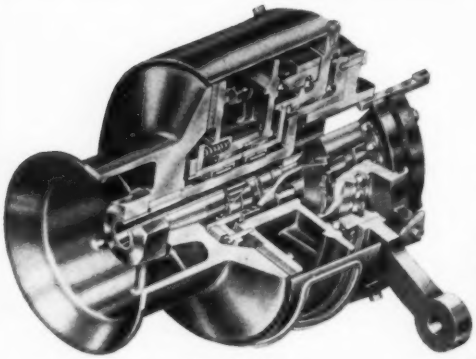
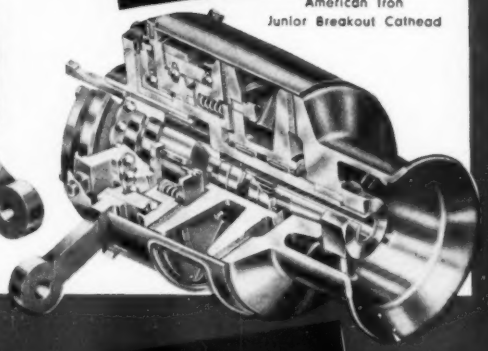


American Iron
Junior Makeup Cathead

Designed for Small and Medium Drawworks



American Iron
Junior Breakout Cathead

IT'S EASY to makeup and breakout tool joint connections with

AMERICAN IRON *Junior* FRICTION CATHEADS

Smaller in size—yet BIG in performance! That's the important news about the new American Iron Junior Friction Catheads. Their light weight and compactness make it possible for them to be safely and economically installed on any small or medium size rig.

As shown above, these catheads are designed with a simple ball-thread activating mechanism—the same as used in our larger friction catheads which have given such outstanding performance on larger drawworks. That's why our new Junior Friction Catheads produce the power that's needed to properly makeup and breakout all tool joint connections!

Check these outstanding advantages:

- Smaller overall dimensions.
- More than enough power to facilitate proper makeup and breakout.
- Line pull closer to shaft bearing.
- Simple and quick installation.
- No adjustment necessary. Pre-adjusted at factory ready for mounting on shaft.
- No sensitive toggles to get out of adjustment.
- Non-crawling clutch drum.
- Instantaneous engagement and release without shock.
- Safety stationary guard that encloses all mechanism.
- Available with air or manual controls.

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NATURAL GAS

Gas Supply Assured for New Orleans Pipe Line

NEW ORLEANS.—United Gas Pipe Line Co. signed contracts to supply a projected 90-mile, 16-in. gas line which can supply this city with 100 to 150 million cubic feet daily and will cost $11,000,000.

Contracts were signed with five operators in four Plaquemines Parish oil fields to purchase casinghead gas. These fields will furnish 50 million cubic feet of gas daily which is half the total supply now being consumed by the New Orleans area.

The United Gas project was announced by state conservation commissioner S. L. Digby, who heralded it as "the most important since I have been down here." Digby praised the participating companies—Gulf Refining Co., Tide Water Associated Oil Co., William Helis, The Texas Co., and Humble Oil & Refining Co.—for their cooperation.

The new pipe line will start north of West Bay field at the far end of the Mississippi Delta, cross the Mississippi River and terminate at th New Orleans city limits. Gathering lines and compressors to supply the line will cost the five participating companies around $4,000,000. Gas will be delivered to the line at 800 psi. The four fields involved are Grand Bay, Quarantine Bay, West Bay and Venice.

Additional gas for the new line will be secured from Gulf and Humble gas wells in Lake Hermitage field. This gas will amount to 15 million cubic feet of gas daily. Negotiations are under way to purchase gas from operators in five other Plaquemines fields—Garden Island Bay, Delta Duck, Delacroix, Potash, and Pointe-a-laHache.

Ohio Fuel Gas Co. Cuts Its Proposed Gas-Rate Increase

Ohio Fuel Gas Co. has cut by approximately one-third the increase it is seeking on its natural-gas rates in Ohio. The proposal came during a hearing before Federal Power Commission in Washington, D. C.

Ohio Fuel said it wanted to raise rates 2.9 cents per thousand cubic feet of gas delivered. It previously said it would seek a 4-cent increase per thousand cubic feet.

The firm estimated the revised increase would total $726,331 per year instead of the $1,022,818 proposed in the original petition. The reduction was made by placing the new proposal on a different fiscal-year basis and amending the rates.

Original application was opposed by several of the 24 Ohio gas companies and municipally owned utilities which buy gas from Ohio Fuel.

Plymouth Oil Completes Benedum Field Gas Plant

Plymouth Oil Co. has announced completion and start of operation of its new $7,000,000 natural-gas plant in the Benedum field of Texas.

First gas from the plant was turned into the pipe line of El Paso Natural Gas Co. for transportation to the Pacific Coast. After initial tests the gas flowed through the line at the rate of approximately 4,000,000 cu. ft. daily.

The rate will be increased progressively over the next few months, according to Walter S. Hallanan, Plymouth president. The firm's contract with El Paso contemplates delivery of 60,000,000 cu. ft. daily.

FPC to Rule Soon on Gas Distribution by Panhandle

Federal Power Commission will fix rules in the near future for cold-weather distribution of available natural-gas supplies among customers of Panhandle Eastern Pipe Line Co.

An FPC spokesman said the problem will receive priority over all others involved in a hearing of Panhandle rate schedules now in progress. FPC said it will fix rules "before the first of the year."

Panhandle Eastern has added approximately 90,000,000 cu. ft. of natural gas daily to its capacity to serve subscribers in Oklahoma, Kansas, Missouri, Illinois, Indiana, Michigan, and Ohio. The firm concedes that its gas supply still will be inadequate to serve needs of all its subscribers when temperatures drop to zero and below.

East Tennessee Natural Is Authorized to Build Line

Federal Power Commission has authorized East Tennessee Natural Gas Co., Chattanooga, to construct an 18-mile natural-gas pipe line in the Knoxville area which will enable the firm to expedite previously authorized service to the Knoxville-Alcoa area. Estimated cost of construction is $875,900.

It will interconnect two other lines, which FPC previously authorized East Tennessee to construct, upon their completion.

Natural Gasoline

Cities Service Completes Pampa Plant Modernization

Cities Service Oil Co. (Del.) has completed modernization and expansion of its natural-gasoline plant at Pampa, Tex., and new facilities are now in operation.

The program included replacement of all distillation equipment and installation of fractionators to separate the products. Replacement also included the cooling tower, boiler plant, all water-treating equipment, and pumping units. The compression plant and direct-fired oil heaters were the only units retained.

Two stages of compression were added, with installation of four 600-hp. angle-type gas engine-driven compressors. Total horsepower at the plant was increased to 4,200.

The expanded plant has been designed to eventually process 18,000,000 cu. ft. of gas daily and will produce approximately 60,000 gal. of liquid products daily, the company reported. Of this amount, approximately 35,000 gal. is natural gasoline and butane, and the remaining 25,000 gal. propane.

Panhandle Group, N.G.A.A. To Meet in Amarillo, Tex.

The Panhandle Plains regional meeting of Natural Gasoline Association of America will be held at the Herring Hotel in Amarillo, Tex., December 9. Two sessions will be featured and the day's activities will be climaxed with a banquet.

G. E. Canaday, Skelly Oil Co., Tulsa, will preside over the morning session and Harold Legatski, Phillips Petroleum Co., Bartlesville, Okla., will be chairman of the afternoon session.

Papers to be presented include: "Control Instrumentation Applied to Light Ends Fractionation," by V. V. Tivy, Foxboro Co., Foxboro, Mass.; "Automatic Compressor Stations," by T. S. Bacon, Lone Star Producing Co., Dallas; and "Operating Problems Relating to Gas Sweetening," by J. S. Conners and A. J. Miller, Phillips Petroleum Co., Bartlesville.

Harry Wheeldon, Shamrock Oil & Gas Corp., Amarillo, is program-committee chairman.

IT'S TOP CHOICE

for 10 rock-bottom reasons...

Republic Electric Weld LINE PIPE

gives you *all* these basic advantages. Each is one of the underlying reasons why this modern welded pipe has so fully proved its ease of installation and trouble-free performance—over a period of almost two decades and in more than 51,000 miles of lines.

1. **Uniform Roundness**—Pipe ends match up perfectly—speed construction—cut costs.
2. **Uniform Diameter**—No "off-size" lengths to cause welding difficulties at joints.
3. **Uniform Wall Thickness**—Absolute dependability throughout every inch of length and circumference.
4. **Uniform High Yield Strength**—Permits building of higher pressure lines—utilizing design values to fullest advantage.
5. **Uniformly Straight**—Lengths line up evenly—go into the ditch freely.
6. **Easy to Bend**—High-ductility steel makes bending in the field easy.
7. **Easy to Weld**—Low carbon steel welds readily—makes sound joints.
8. **Freedom from Scale**—Insures against clogged valves, contamination of petroleum products.
9. **Long Lengths**—Reduces number of joints—makes jobs move with longer strides.
10. **Inspected Inside and Out**—Republic Electric Weld Line Pipe is made from flat-rolled steel both sides of which are closely inspected. Thus, you are assured that the surface which becomes the inside wall when formed into pipe is free from hidden defects.

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PIPE LINES

Portland Lets Contracts

Portland Pipe Line Co. has announced successful low bidders for the Portland-Montreal 134-mile, 18-in. project are as follows: Oklahoma Contracting Co., 85 miles in Section 1, at the southern end; Associated Pipeline Contractors, Inc., for Section 2, 81 miles; Fred Mannix & Co., Ltd., 68 miles, Section 3, located in Canada.

Trunkline System to Feed Panhandle Eastern

Panhandle Eastern Pipe Line Co. has acquired 60 per cent of the outstanding stock of Trunkline Gas Supply Co., according to a joint announcement of W. G. McGuire, chairman of Panhandle, and Ralph K. Davies, president of Trunkline.

As an outcome of this deal, Trunkline will commence construction of a system more than 1,400 miles long which will consist of a 740-mile, 26-in. main line from Longville, La., to the Tuscola compressor station on the Panhandle system in eastern Illinois, plus a gathering system of approximately 700 miles, with pipe in diameters ranging upward from 10-in. Most of this pipe will be 18, 20, and 24-in. Over-all cost of the main project is estimated as $85,000,000.

The main line, equipped with four compressor stations having 32,000 hp., will have a throughput of 250,000,000 cu. ft. per day, and it is capable of being expanded to handle up to 350,000,000 cu. ft. daily by additional compressor facilities. The system has been designed by P. McDonald Biddison, Chicago.

Natural-gas reserves contracted for supplying the line have been estimated to be 2,200,000,000,000 cu. ft. Gulf Coast fields to be connected with the proposed system include Lakeside and Holmwood in Louisiana; and Chocolate Bayou, Pinehurst, Altair, Columbus, Ramsay, and McAllen, all in Texas.

The management organization of Trunkline has not yet been determined.

An application for the present program has been filed with Federal Power Commission. Trukline's first application to the commission was made early in 1947 for a line from the Gulf Coast to Keokuk County, Iowa. Later a second application was made and granted to Trunkline which changed the terminus to the Palmyra, Nebr., station of Northern Natural Gas Co. But Northern Natural refused to enter into a written agreement with Trunkline. The present arrangement with Panhandle Eastern therefore represent the consummation of a series of negotiations that have been carried on for nearly 3 years. Through a recent agreement with Panhandle Eastern, Trunkline will sell 250,000,000 cu. ft. daily for a 20-year period.

Cities Service Completes Three New Pump Stations

Cities Service Pipe Line Co. has completed modernization of three pump stations and tank farms in Kansas and Oklahoma. New facilities of the Boyer station at El Dorado, Kans., Walnut station, south of Augusta, Kans., and Cimarron station near Guthrie, Okla., were placed in operation recently.

At Boyer station, a steel-frame fire-resistant building has been erected adjoining a similar building owned by the Texas-Empire Pipe Line Co. The new structure houses two new centrifugal pumps driven by 200-hp. electric motors, and two small Texas-Empire pumping units. Work on the manifold and tank-farm lines is also completed.

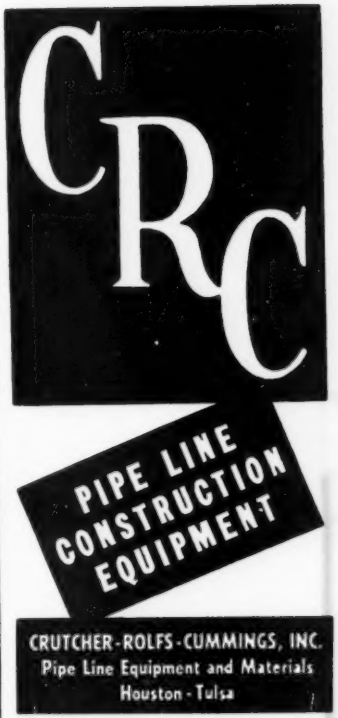
The former auxiliary-pump building at Cimarron station has been remodeled and now houses three new pumping units similar to the Boyer units, an office, locker room, shop, and sample grind-out room. Other construction completed includes the new manifold and tank farm lines.

The offices at both Boyer and Cimarron house control equipment for the pumping units and are isolated from the pump rooms by vaporproof walls as a precaution against fires. Large glass panels in the office enable station personnel to command a full view of the pumping units.

At Walnut station, a 75-hp. motor-driven displacement pump and a 60-hp. motor-driven centrifugal pump have been installed. The pumping units, control equipment, and office are housed in a new prefabricated steel building. All station and tank-farm piping is now ready for full-scale operation.

Texas-New Mexico Pipe Line Lets Contracts for Line

Contracts for the construction of approximately 61 miles of crude-oil pipe lines in West Texas have been awarded by Texas-New Mexico Pipe



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EXPERIENCE
The 66 employees of Latex Construction Company participating in our Employees' Retirement Plan during 1948 (eligibility requirement: 5 years or more continuous employment) have a combined total of 977 years of pipeline construction work. These years of experience and specialization are reflected in the efficiency of Latex pipeline construction.
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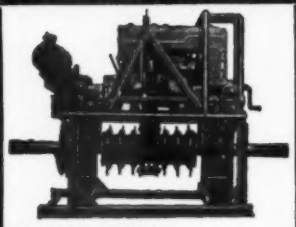
CROSE
MODEL M
CLEANING MACHINE



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PIPE CLEANING . . .

with Crose pipe cleaning machines. Machines designed for pipe sizes from 2" to 30" diameter. Equipped for stationary or traveling operation. The machines with independent speed control on travel and priming head.

Standard models:

Model M—3" to 14" Pipe Cleaning machine
Model K—16" to 26" Pipe Cleaning machine
Cleaning and priming machines for larger pipe sizes also available.

Available on rental or outright sale basis.

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MANUFACTURING COMPANY, INC.
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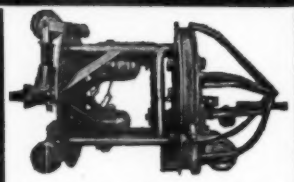
CROSE
ELECTRIC MODEL
INTERNAL LINE-UP CLAMP



The electric model shown above is a rugged, heavy-duty clamp, electrically operated for the tough jobs.

ADVANTAGES:

For The Owners:
Better stringer bead; better finish weld; better pipe line.

For The Builder or Contractor:
Speed; stringer bead cut-out eliminated; economy; swabbing and alignment with one tool; less labor required.

Available for pipe sizes 12" through 36"
Rental or Outright Sale Basis

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MANUFACTURING COMPANY, INC.
MAIN OFFICE
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M & M BUILDING HOUSTON, TEX.

Line Co., according to R. B. McLaughlin, president of the company.

Contract was let to Carl H. Dunn, Fort Worth, to build 40 miles of 10¾-in. pipe line, extending from a point in Borden County to the Colorado City pump station, Scurry County, on the Basin System. Work is expected to begin about December 15.

Wright Construction Co., Lovington, N. M., was given the job of constructing 16.08 miles of 6⅝-in. pipe line, and 5.41 miles of 4½-in. pipe line in southwest Borden County and northwestern Howard County. Work will begin immediately.

Texas Eastern Gets 60-Car Shipment of Pipe for Line

Texas Eastern Transmission Corp. has received a 60-car shipment of 20-in. welded steel pipe for its East Texas-Louisiana pipe line, from Basalt Rock Co., Napa, Calif., operating jointly with Kaiser Steel Corp.

The shipment is in connection with one of the first large orders since the joint Kaiser-Basalt pipe undertaking was announced. Operation was made possible in part by fabrication-in-transit rate allowed by railroads, which permits steel plate from the Fontana steel works to move to Basalt's Napa plant, and thence to point of use in fabricated form in competition with other regional mills.

Basalt expects to have its additional fabrication and welding equipment permitting fabrication of 40-ft. length, 30-in. diameter pipe operating soon after first of the year.

Transcontinental Work Is Running Ahead of Schedule

Work on Transcontinental Gas Pipe Line Co.'s natural-gas line from Texas to New York City is progressing ahead of schedule, and the 1,840-mile, $190,000,000 project should be completed by October of next year, according to Claude A. Williams, president of the company.

Williams reported that the steel strike has not interfered with progress of the line, and "so far as can now be determined, there will be no delay in the delivery date for natural gas to New York City."

Up to October 15 a total of 323 miles of 30-in. pipe had been completed, and Williams said that enough pipe is on hand to complete the 1949 construction program. Pipe deliveries from the firm's two major suppliers, Kaiser Co., Inc., and Consolidated Western Steel Corp., are expected to keep pace with the accelerated 1950 program, he said.

Work will be suspended around December 15, due to weather conditions, and will not be resumed until next spring.

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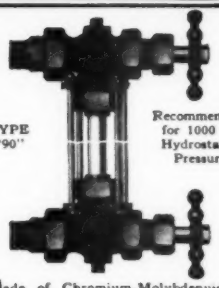
LIQUID LEVEL GAGES



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With
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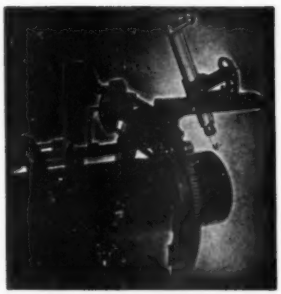

The H & M PIPE CUTTING and BEVELING MACHINE
for 2 to 36-in. pipe

SPEED: Complete cut and bevel can be made on 12 inch pipe in about 2 minutes.
ECONOMY: Save approximately one-half labor and gas costs.
PORTABILITY: Can easily be carried from one pipe section to another.
Write for Literature and new, lower prices. Out Of Rounds attachment fits all machines.

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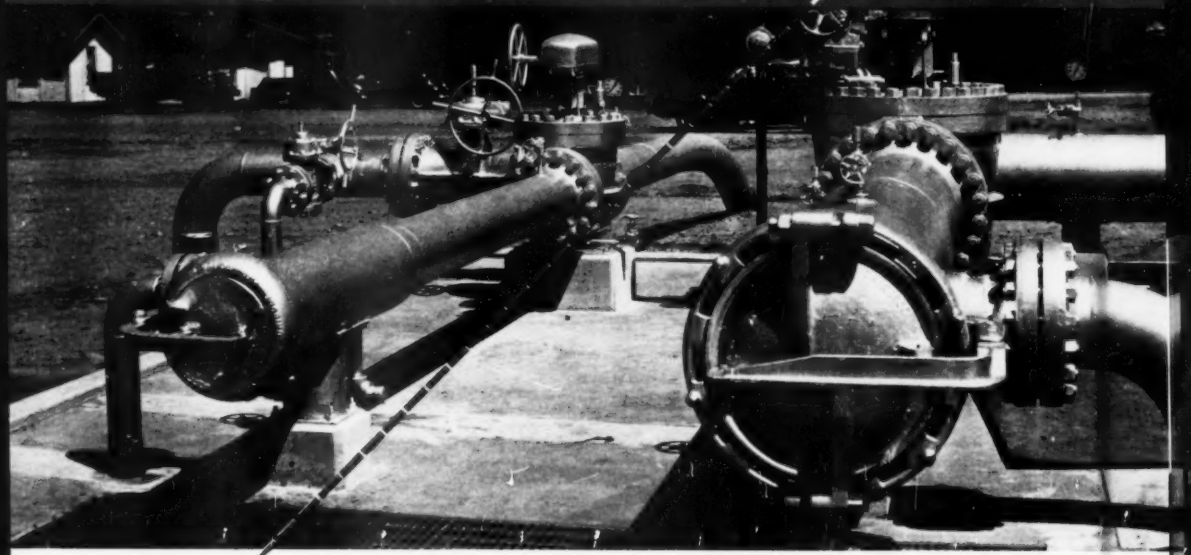

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Any line or unit that requires closures, such as strainers, separators, scrubbers, mist removers and similar pressure vessels, may be UNIBOLT-equipped to real advantage. Wherever a blind flange is applicable, a UNIBOLT Coupling with Blanking Plug will do the job better — seal tighter, reduce weight, and save time.

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In stock—all oil well supply stores

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Pipe Liners Club Elects Officers for 1949-50

The Pipe Liners Club of Tulsa, since its organization in September 1948 with 20 charter members representing 10 companies, has grown to a membership of 121. Purpose of the club is to interchange ideas regarding pipe-line practices, design, and operational problems, and this is accomplished through presentation at monthly dinner meetings of papers on various subjects relating to operations of pipe lines.

Officers elected for the 1949-50 year are: P. L. Reichard, assistant to the general superintendent, pipe-line division, Gulf Refining Co., president; J. D. Jones, master mechanic, pipe-line division, Gulf Refining Co., vice president; F. C. Whiteside, assistant chief engineer, Interstate Oil Pipe Line Co., secretary, all of Tulsa; and G. G. Billings, assistant area superintendent, Shell Pipe Line Corp., Cushing, treasurer and assistant secretary.

Directors are F. V. Cook, master mechanic, Stanolind Pipe Line Co., and T. D. Williamson, Jr., vice president, T. D. Williamson, Inc., both of Tulsa; G. P. Jennings, chief engineer, products pipe-line division, Phillips Petroleum Co., Bartlesville; and J. L. Cahill, chief engineer, Continental Pipe Line Co., Ponca City.

Hearing Set December 7 On Transcontinental Proposal

Federal Power Commission has scheduled a hearing December 7 in Washington, D. C., on applications of Transcontinental Gas Pipe Line Corp., which is proposing to expand capacity of its Texas-to-New York City natural-gas pipe line, now under construction, and South Jersey Gas Co., which is seeking authorization to build a pipe line in New Jersey in order to receive gas from Transcontinental.

The FPC at the same time granted Transcontinental's motion to sever from its application that part of the request relating to the construction of facilities between New Jersey and the New York-Connecticut state line for deliveries to Northeastern Gas Transmission Co., which is proposing to construct a pipe-line system in the New England area; and the construction of a sales lateral extending from Paterson, N. J., to the proposed New Jersey-Connecticut line. In lieu of the latter line, Transcontinental is proposing to build a lateral extending from Paterson in a southerly direction to its main line.

South Jersey is proposing to build 77 miles of pipe line designed to carry about 30,000,000 cu. ft. of natural gas per day. The company plans to receive approximately 18,000,000 cu. ft. daily from Transcontinental.

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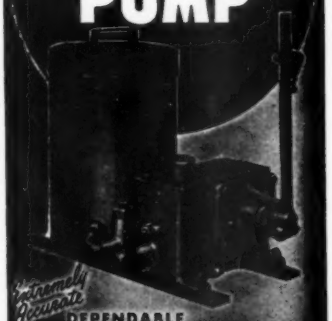
TYPE "C" CHEMICAL MEASURING PUMP



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Accuracy of delivery in McCord chemical pumps is the result of a finely engineered design with minimum number of parts. Dependability is insured because working parts are fully enclosed, protected from dirt and the elements. Specify McCord. For sale by National Supply Co.

Standard of the Oil Fields
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Here's the Car You Really Need!

The New 4-Wheel-Drive WILLYS Station Wagon

Pulls You Through Where Others Are Pulled Out!

This full-sized car was built for the roughest kind of country you'll ever have to travel! The rugged all-wheel traction of the new Willys Station Wagon is more than a match for deep-rutted mud, drifting snow and slippery grades. Roads or no roads—you can always depend on its "go-anywhere" traction when conditions are too rough for ordinary cars!

Built on a newly engineered 4-wheel-drive chassis with a sturdy steel girder frame, 104½" wheelbase, the new Willys Station Wagon gives you greater safety, roominess and comfort. There are seats for six with big space for luggage, tools and equipment inside the durable all-steel body.

You get maneuverability along with ample road clearance and flat, open, dent-resisting fenders. Ask your Willys-Overland dealer to demonstrate this great oil country car.

It's a doubly useful car—seats easily lift out to provide 98 cu. ft. of hauling space. Work or sleep in it. With the tailgate down you have a flat bed 8½ ft. long and plenty wide enough for sleeping two adults. Seats and interior are washable.

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Speed is of prime importance in successfully meeting emergency recovery jobs. To help you make a complete recovery faster and keep loss of drilling time to absolute minimum, Globe distributors are strategically located and ready 24 hours a day to deliver fast, prompt, efficient service. You'll be way ahead when you run a Globe.

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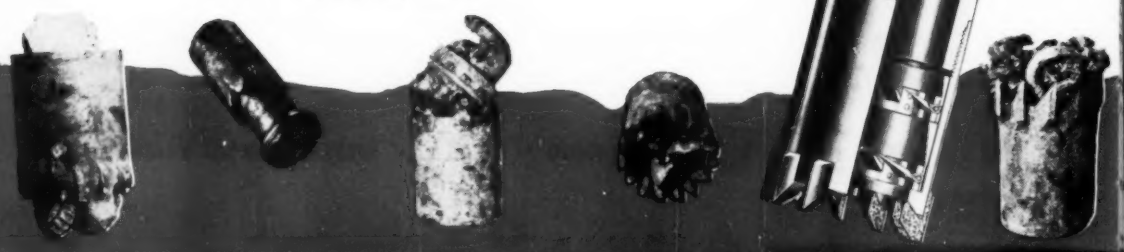

Among the Drilling Contractors

Drilling Activity Exceeds Previous Peak for Year

An increase during the week ended November 14 (latest report) in the number of rotary rigs operating in the United States and western Canada boosted drilling activity in these regions to the highest level it has been at any time this year. The previous peak in activity this year was during the week ended April 25 when 2,167 rigs were reported running. The total reported in the latest survey was 2,216, or 49 rigs more than were active at the previous peak.

Since the latter part of September, when the present upward trend in drilling activity began, there has been an increase of 226 in the number of operating rigs. At that time, the number of rigs had dropped to 1,990 in a steady decline in activity that had been felt each week since the April peak.

Most notable increases in drilling activity in the latest report were in the Gulf Coast and West Texas and New Mexico areas. Smaller gains were indicated in the Arkansas, North Louisiana and East Texas, and the Oklahoma and Kansas areas. Decreases in other areas were negligible. The number of operating rigs by areas follows:

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area—	Week ended 11-14-49	Change week ended 11-7-49	Change week ended 11-15-48
Gulf Coast	516	+ 44	—114
W. Tex.-N. Mex.	659	+ 44	— 61
Ark.-N. La.-E. Tex.	168	+ 12	— 20
Oklahoma	247	+ 14	— 62
Kansas	125	+ 11	— 5
Illinois-Eastern	140	— 4	— 5
Rocky Mountains	111	— 3	— 49
Pacific Coast	167	— 4	— 52
Total United States	2,133	+114	—246
Western Canada	83	— 4	+ 8
Total	2,216	+110	—238

*Courtesy Hughes Tool Co.

Contractors Warned About Canadian Insurance Rules

American drilling contractors moving rigs into Canada are cautioned by the Western Canada Petroleum Association in a bulletin just issued that they, in renewing insurance on their equipment, ascertain if their insurance companies are licensed to do business in the province in which they are to operate.

The bulletin points out that under provincial laws if an insurance company is not licensed to do business in a province, the contractor is liable for a surcharge of 50 per cent of the insurance premium to be paid the province. Holders of policies with unlicensed insurance companies are required, the bulletin explained, to notify in writing within 1 month the superintendent of insurance in the province the terms of the insurance, the name of the insurance company, and the amount of the premium, and at the same time provide remittance for the surcharge.

Olney Firm Changes Name

C. G. "Betsy" Davis and L. O. Paulsell have acquired the interest of Perry Fulk in the Fulk & Davis Drilling Co., Olney, Ill., and have changed the name of the company to Betsy Davis Drilling Co.

H & H Drilling Co., Wichita, is drilling C. L. Mahan and associates 1 Kroeger, 26-12-20, a wildcat in northwestern Ellis County, Kansas.

Thomas P. Pike Drilling Co., Los Angeles, has taken a contract to deepen a formerly abandoned hole, 1 Lorraine, in the Placerita Canyon area for Robert S. Rocco. The company now is operating five rigs in the area.

Strozier Drilling Co. is the contractor for J. A. Egan and associates at 1 Branch, 17-21n-7e, a newly started semiwildcat test in the Greenup district, Pawnee County, Oklahoma.

Delta Drilling Co., Tyler, Tex., announces the transfer of Wayman Moore to Evansville, Ind., where he will be district office manager. Guy B. White is district manager at Evansville.

Brown and Tomer, Tulsa, are running a string of cable tools for W. L. Johnson in the development of a recently opened shallow gas area 5 miles north of Sallisaw, Sequoyah County, eastern Oklahoma. Tools now are on their second hole. Gas was found in a sand at a depth of approximately 1,000 ft.

Whiteley-Phillips Drilling Co. is the contractor for A. O. Phillips on a test being started in the Knowles Survey,

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2 miles southwest of Lindale, Smith County, East Texas. Drilling is projected to 7,600 ft. or the Paluxy.

Trigg Drilling Co., Oklahoma City, has been awarded contract for an 8,000-ft. test to be drilled for Carter Oil Co. near Rocky in southern Washita County, Oklahoma. Location is in 22-8n-18w.

Robertson & Matheny Co., Wichita Falls, Tex., is contracting for Socony-Vacuum Exploration Co. on a wildcat test being started about 7 miles north of the Montana border in south-central Alberta Province, Canada. The test, 1 Branch, is in LSD 13, 3-2n-19w4th, which is about 45 miles south and a little east of Lethbridge.

Helmerich & Payne, Inc., Tulsa, has contracted with Stanolind Oil & Gas Co. for a 9,000-ft. wildcat test in Howard County, West Texas. It will be 1 Hutton, located in Section 4, Block 31, T&P Survey.

Powell & Peters Drilling Co., Great Bend, Kans., is drilling a semiwildcat test a half-mile northeast of production in the North Dayton pool in Phillips County, northwestern Kansas. The location, in 32-1-18, is only 6 miles south of the Nebraska line. The Kansas City lime, prospective pay zone, is expected about 3,460 ft.

Brinkerhoff Drilling Co., Casper, Wyo., has the contract for Texaco-McColl - Frontenac's second Calmar test on the southwest fringe of the Leduc field extension area, Alberta, Canada.

Delta Drilling Co., Tyler, Tex., is drilling for William Hamm, Jr., at 1 L. C. House, a wildcat test 3 miles northeast of Tyler in the Hezekiah George Survey, Smith County, East Texas.

Nowery Drilling Co., Shreveport, is the contractor at Stanolind Oil & Gas Co. 1 Scott, latest well started in the Waskom field on the Texas-Louisiana line. The location is on the Louisiana side, in 29-17n-16w, Caddo Parish.

Redwing Drilling Co. is the contractor for W. M. Smith and associates at 1 Dickerson, a wildcat being started in 8-5n-1e, north of Knoxville, Franklin County, Mississippi. Objective is the Wilcox sand.

Pabco Drilling Co., Wichita, is contracting for Waugh Brothers at 1 Martin, a wildcat test being started in Wabaunsee County, northeastern Kansas. Location is in 34-13-12e.

Dick Wegener, Oklahoma City, has moved a rig to a wildcat location south of Duncan, Stephens County, Oklahoma, where he will drill a 7,500-ft. test for L. C. Tharpe and associates. Location is in 21-1s-7w.

Buffalo Drilling Co. is starting a wildcat test in Concordia Parish, eastern Louisiana, for R. A. Campbell and Dan Reynolds. Location is for 1 Harris-Interstate in 1-7n-10e.

Big Chief Drilling Co., Oklahoma City, is drilling for Cities Service Oil Co. at 1 Chalepah, 10-5n-12w, an outpost test for the Apache pool, Caddo County, Oklahoma.

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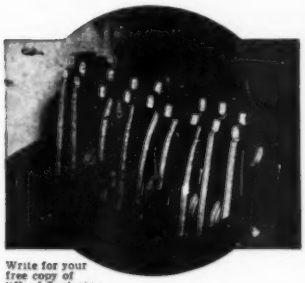

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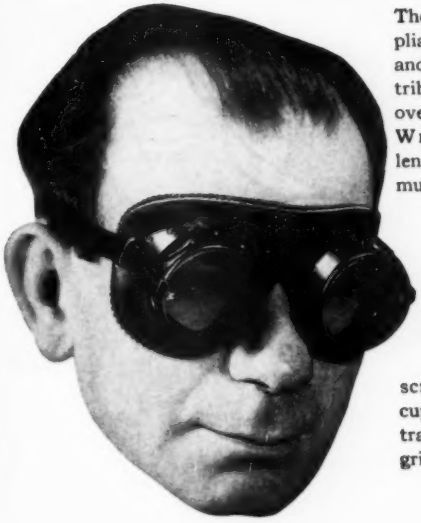

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Exploration and Drilling

Symposium on "Poulter Seismic Shots"

AT least some of the more thoughtful geophysicists are disturbed at what they consider too drastic a swing in opinion about the prospects and possibilities of surface shooting (the Poulter method), resulting from what they believe is a misinterpretation of the Geophysical Society of Tulsa's symposium of reports on experiments with the method.

These men point out that all radically new proposals in any scientific or technological field tend to arouse emotional reactions that swing to extremes in the early stages, either of optimism or condemnation. They say history indicates that usually both swings take place sooner or later, with time ultimately placing the truth somewhere between the two extremes.

It is true, they say, that the Tulsa symposium, both as originally given by a group of authors, and the condensed version summarized for the benefit of the Dallas regional meeting last week, at first glance does appear condemnatory. Reports were given on actual field experiments over a wide range of territory, various climatic conditions, and a variety of situations where surface and near-surface formations presented different problems.

For instance, starting about as far north as it is possible to get, reports were given on the results of experiments in the Point Barrow area of Alaska. Here one of the big problems is the permafrost or permanently frozen layer of earth just beneath the surface, and its effect on reflections and refractions.

This was followed by a report on experiments in Canada about 50 miles north of Edmonton, where the prospective area had a flat, sandy clay surface in the eastern half, favorable for all types of shooting; but hilly, rough terrain in the western half, complicated by sand and gravel deposits that made for poor records with any type of shooting.

Another report covered areas on the Edwards plateau in Texas, where both shot-hole and surface-shooting techniques were reported as failures. Reports on two areas in Oklahoma where gypsum formations near the surface give trouble were also unfavorable. Then reports on areas in parts of Terry and Stonewall counties, Texas, were unfavorable. A report on a small amount of experimental work in the San Juan basin of New Mexico seemed to fit the same pattern.

On the other hand, reports from one of the contractors, who has been active in field experiments and development of the Poulter method from the beginning, were decidedly at variance with the unfavorable reports. For Lea County, New Mexico, a tough area, they reported fewer but more outstanding events from surface shooting than from shot holes. In the Oklahoma Panhandle they reported air shooting results somewhat better. They reported a surface shooting map of Benedum field of Upton-Reagan counties, Texas, showed not too much difference from shot-hole map, and reasonable correlation with apparent subsurface as developed by drilling.

Dr. Poulter's rebuttal of the unfavorable reports was directed at two main points: (1) that little attention was paid to picking a pattern that would give an energy frequency suitable for good penetration and reflection in the particular area; and (2) that the recording apparatus used was unsuitable for the type of reflections to be expected from surface shooting (probably a matter mainly of filter settings on geophones).

Some of the more thoughtful geophysicists incline to the belief that there is substantial merit in Dr. Poulter's arguments. They believe that ultimately a place, perhaps small, perhaps somewhat larger, will be found in the geophysical picture for some uses for surface shooting. At a minimum they say it offers a possibility of checking duplicate shots in a given area with varying adjustments of filters and geophone groupings, without the distortions of basic conditions that two shots in the same hole, or two shots in holes a short distance apart, must inevitably introduce. The more optimistic adherents of surface shooting point out that they have maintained from the beginning that "know-how in the field in application of surface shooting is one of the vital elements in success."

Charles J. Deegan

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

SOUTH LOUISIANA.—A new Wilcox oil discovery 1 mile north of Big Island field, Rapides Parish, gaged 195 bbl. of 48°-gravity oil in 12 hours on preliminary test through 7/32-in. choke. The well, Union Producing Co. 1 Hudson, was drilled to 10,225 ft. and plugged back to 5,625 ft. after attempts to find oil at lower depths had failed. Production is through perforations at 5,565-67 ft. A new sand in Avondale field, Jefferson Parish, has been opened by Humble Oil & Refining Co. 1 Marrero Land & Implement Association. The well flowed 159 bbl. of 31.2°-gravity oil daily through 9/64-in. choke. This is the second well for this field, which was discovered by Humble last June.

WEST TEXAS.—Canyon lime production just north of the Snyder city limits, Scurry County, was indicated at Standard-Fryer Drilling Co. 1 York, NW NW 180-3-H&GN, which flowed oil on a drill-stem test in the top of the Canyon from 6,728-64 ft., total depth. Gas surfaced in 6 minutes and oil in 80 minutes. Recovery was 4,500 ft. of clean oil. Fillup in the hole was estimated at the rate of 40 bbl. an hour. In Winters field, Runnels County, Humble 1 Bud Herndon, 3 miles south of Winters, opened Pennsylvanian pay for the field, flowing 167 bbl. of 45°-gravity oil a day. Top of pay was minus 2,163 ft. Initial production was through ½-in. choke.

SOUTHWEST TEXAS

New Sand Discovery In Palo Blanco Field

CORPUS CHRISTI—W. H. Holland has completed the 1 Alexander for a new sand discovery in Palo Blanco field, Brooks County. The well was drilled to a depth of 3,659 ft. with the pay topped at 2,960 ft. The casing was perforated from 2,990-97 ft. with 40 shots, and through a 5/64-in. choke the well flowed 75 bbl. of 31.5° gravity oil daily. The new discovery is located in the Palo Blanca Grant.

A new gas field 5 miles east of Dee Davenport field, Starr County, has been discovered with completion of the Baldridge & King, Inc., A-1 State-Slick. The well flowed 16,800 M.c.f. gas per day on open flow with shut-in pressure of 3,250 psi. The well is bottomed at 6,736 ft. and production is through perforations at 6,339-51 ft. Location of the well is in Porcion 41, 660 ft. west of The Texas Co. 1 Bloomberg.

Testing operations have begun on The Texas Co. 1 W. L. Hart et al, Starr County wildcat in the Nicholas Zamora Survey, Abstract 282. On 20-minute drill-stem test at 3,797-806 ft., the well recovered 38 ft. of gas-cut mud through a ¼-in. choke with bottom-hole pressure flowing 175 psi. Operators are now drilling ahead at 4,775 ft.

The new shallow Buena Vista field in Starr County has a second oiler. Clark Fuel Producing Co. 1 Lucio Canales made an estimated 60 bbl. of 23.7°-gravity oil daily through perforations at 1,759-880 ft. The discovery well, the 1 Gervacio Canales, was finaled for 33 bbl. The two wells are located in Share 2B, La Sacatosa Grant, approximately 7 miles southwest of Guerra field.

Ryan, Hays, & Burke 1 Margaret E. Davis, Aransas County wildcat, 10 miles west of Rockport, is testing through perforations at 9,246-53 ft. The well cored 9 ft. of sand, the lower 3 ft. of which showed distillate, and set 5½-in. casing at total depth of 9,263 ft. The test is in Section 7, Block 48, Resubdivision, Sixth Addition, Taft farm lands.

The 27 new locations in Southwest Texas include 9 wildcat starts, 1 each in Bastrop, Caldwell, Guadalupe, Milam, Brooks, Jim Hogg, and Jim Wells counties and 2 in Duval County. There were four successful exploratory tests completed, one each in Brooks, Hidalgo, Nueces, and Starr counties, while seven were dry, one each in Bexar, Caldwell, Frio, Jim Wells, and Webb counties.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Brooks County: New pay at Palo Blanco—W. H. Holland and N. B. Hunt 1 Alexander, Palo Blanco Grant, top sand 2,990 ft., TD 3,659 ft., perf. 2,990-97 ft., IP: 75 bbl oil daily, 5/64-in. choke, TP 140 psi., 31.5° gravity.

Hidalgo County: New oil pool—Humble Oil & Refining Co. 5 Santa Fe Ranch, 11 mi. S of Encino, San Salvador Del Tule Grant, TD 10,125 ft., perf. 7,722-28 ft., IP: 73 bbl. oil daily, 3/32-in. choke, GOR 718, TP 1,225 psi., 42° gravity.

Nueces County: Oil discovery at "Rand Morgan"—Rand & Morgan M-1 fee, Block 3, Richard King farm lots, 8 mi. NW of Agua Dulce, top sand 5,388 ft., TD 5,425 ft., perf. 5,392-94 ft., IP: 57 bbl. oil per day, 9/64-in. choke, TP 650 psi., 47° gravity.

Starr County: Gas discovery—Baldridge & King, Inc., A-1 State-Slick, Survey 885, 5 mi. E of Dee Davenport field, TD 6,736 ft., TD 6,736 ft., perf. 6,339-51 ft., IP: 16,800 M.c.f. gas daily on open flow, SIP 3,250 psi.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Atascosa County: Luling Oil Co. 1 Sharp Whitley, C. W. Hood Sur. A-1588, 7 mi NE of Bigfoot, dry, TD 2,655 ft.

Miller & Dauchy 1 Rogers, L. Menetrier Sur. 1347, 3 mi. W of Kyote, dry, TD 3,953 ft.

Bexar County: Rollin V. Hill, Jr., 1 J. T. Terrill et al, M. Gortaris Sur. 7, 15 mi. SE of San Antonio and 2 mi. W of Cooksey field, dry, TD 1,860 ft.

Caldwell County: R. V. Muckelroy & Son 1 Verna Grover Moss, Byrd Lockhart League, 1 mi. N of Lockhart, dry, TD 1,640 ft.

Frio County: Newman Bros. Drilling Co. and Alaska Steamship Co. D-1 Oppenheimer & Lang, I&GN RR Sur. 11, A-410, 7 mi. E of Pearsall, dry, TD 4,274 ft.

Jim Wells County: Rand & Morgan M-2 fee, Richard King farm lots, 8 mi. NW of Agua Dulce, dry, TD 5,370 ft.

Webb County: Dulaney Oil Co. 2 A. M. Bruni Estate, Sur. 2083, 8 mi. SW of Mirando City, dry, TD 1,690 ft.

LA.-ARK.

Cottage Grove Well Will Test Higher Sands

SHREVEPORT.—Gulf Refining Co. 1 R. Zt Biedenharn, 23-21n-14w, Paluxy wildcat in the Cottage Grove area of Bossier Parish, plugged back from 3,220 ft., total depth, to 2,100 ft. to continue testing the Nacatoch. A drill-stem test of perforations at 1,005-13 ft. produced a small amount of gas. Further flow tests produced salt water with the gas.

Three miles east of Rocky Mount, C. H. Murphy 1 Crystal Oil & Refining Corp., 14-21n-12w, was dry at 9,508 ft., in the Cotton Valley. The last section cored, from 9,390-9,490 ft., recovered shale and siltstone with a faint odor of gas but was not tested.

Union Producing Co. 1 Section 13 Unit, 13-17n-12w, deep test in the Sligo field, was drilling ahead below 10,240 ft. in the Cotton Valley. According to reports, it may be carried to the Smackover. Bodcaw section of the Cotton Valley was topped at 8,101 ft., by cores.

Caddo Parish.—Plymouth Oil Co. 1 Thigpen-Herold, 12-17n-16w, Travis Peak test, was drilling ahead below 6,140 ft. Operations were delayed by a fishing job at 5,925 ft. The bottom 14 ft. of core recovery from 5,896-5,925 ft. was fine-grained, shaly sand with slight gas odor, and 28 joints of pipe was dropped in the hole in an attempt to run a drill-stem test.

Claiborne Parish.—Gulf Refining Co. 1 Kinnebrew, 26-20n-7w, Athens field deep test, was drilling below 7,607 ft., in the Travis Peak. A core from 7,336-7,423 ft. recovered siltstone and shale, having a light odor of gas in spots.

Ohio Oil Co. and others 1 O. L. Martin, Martin, 3-22n-7w, cored top of the Smackover at 10,414 ft., and was coring ahead below 10,466 ft. Elevation is 350 ft.

Jackson Parish.—H. J. Strief 1 Louisiana Central Oil & Gas Co., SE NE 16-14n-1e, cut 26 side-wall cores in the Wilcox from 1,360-2,225 ft., but recovered no shows. It drilled ahead below 3,850 ft. in the upper Cretaceous.

Ouachita Parish.—Petersen Drilling Co. 1 Breece Lumber Co., 30-17n-5e, flowed dry gas under 250 psi. pressure on a 2-minute drill-stem test from 5,354-80 ft. Operators cored ahead in the lower Glen Rose at 5,597 ft.

Arkansas.—T. L. James & Co. 1 Nunnally, 19-19s-12w, continued pumping tests of Nacatoch perforations at 2,323-48 ft., recovering 15 bbl. of fluid per day which was 65 per cent salt water. Field reports did not indicate whether or not the balance of recovery was oil. Previous swabbing recovered mud and water with a show of oil.

In Union County, C. H. Murphy & Co. 1 Gregory, SE SW 28-19s-18w, was drilling in the Cotton Valley at 7,234 ft.

NORTH LOUISIANA WILDCAT FAILURES

Bossier Parish: J. F. Nagle 1 J. H. Walker, NW NE NW 14-17n-13w, dry, TD 5,641 ft., water in Rodessa at 4,840-46 ft.

Clark Sample et al 1 Applegate-Kendall, NE NE NE 4-19n-12w, dry, TD 1,255 ft., elev. 226 ft., Nacatoch 1,080 ft.

Caddo Parish: R. S. Allison 1 H. C. McKinney, SW NW SW 12-22n-15w, dry, TD 3,510 ft., Blossom 2,286 ft., lower Cretaceous 2,663 ft., Paluxy 2,663 ft., Morringsport 3,362 ft.

Tensas Parish: Petersen Drilling Co. 1 H. C. McKinney, NW SW 11-13n-10e, dry, TD 7,966 ft., elev. 78 ft., Wilcox 2,837 ft., Midway 5,110 ft., Clayton chalk 5,660 ft., Penrod sand 7,408 ft., Tuscaloosa 7,508-44 ft., Massive not reported, Fredericksburg 7,563 ft., Paluxy 7,663 ft., swabbed some free oil and salt water from Tuscaloosa at 7,516-26 ft.

ARKANSAS WILDCAT FAILURES

Arkansas County: J. L. Youngblood 1 J. B. West, NW NE 24-4s-2w, dry, TD 4,183 ft., elev. 186 ft., Nacatoch 3,595 ft., Paleozoic 4,179 ft., no shows.

Hempstead County: Sam Sklar 1 Evans, SE NE 35-10s-24w, dry, TD 1,835 ft., elev. 406 ft., James 1,185 ft., Travis Peak 1,375 ft., Cotton Valley 1,800 ft., Eagle Mills 1,811 ft.

Union County: Marine Oil Co. and Zach Brooks 1 T. C. Culbertson est., SW SW NE 1-18s-14w, dry, TD 6,764 ft.

EASTERN TEXAS

Texas Co. Venture Tests Oil Show

DALLAS.—The Texas Co. 1 John Marshall, A. Tuttle Survey, Grayson County wildcat 2½ miles south of Sandusky, drilled brown lime with oil odor at 6,602-13 ft. A 2-hour drill-stem test from 6,597-6,613 ft. showed gas in 70 minutes and recovered 10 ft. of oil and gas-cut mud, plus 1 gal. of brackish oil. Bottom-hole pressure was 450 psi. in 20 minutes. Additional oil shows in lime were found at 6,666-72 ft., which was not tested, and operators were drilling ahead below 6,698 ft. at last report.

Denton County.—Lee Hicks has filed application to drill a 2,000-ft. rotary wildcat 1½ miles southeast of Bolivar gas field, and about 1 mile northeast of the Bolivar townsite. It is to be the 1 Mrs. Mary E. Curtsinger, located 2,500 ft. from south and 850 ft. from west lines, J. B. P. January Survey, A-658.

Theck & Cross Drilling Co. staked location for a wildcat 1¼ miles northwest of Bolivar field as the 1 F. W. Fischer, 630 ft. from south and 630 ft. from west lines, east half, William Allred Survey, A-20. Proposed depth was 2,000 ft.

Collin County.—O. W. Killam, Laredo independent, was said to be ready to drill an exploratory test in the G. A. Wilson Survey, 2 miles northwest of Weston, in the northwest corner of the county. According to report, Killam's own tools were to be used, and projected depth was 3,200 ft.

Falls County.—R. F. Ruffner was moving in tools at E. W. Jarman and others 1 Mrs. Lola Garrett, wildcat in the M. Hunt Survey, 1½ miles west of Kosse, near the Limestone County line. The well was previously drilled to 2,033 ft., and had logged gas shows in the Pecan at 1,878-80 ft. and around 1,960 ft. New contract is to 3,650 ft., which is expected to explore the Woodbine and Edwards sections.

Anderson County.—Continental Oil Co. 1 Royall National Bank, discovery well ½ mile southeast of Tennessee Colony, was waiting on state potential of the lower Rodessa section. Initial production, from the upper Rodessa perforations at 8,865-85 ft., was 108.5 bbl. of 45.5°-gravity oil, with 208,408 cu. ft. of gas in 24 hours, flowing

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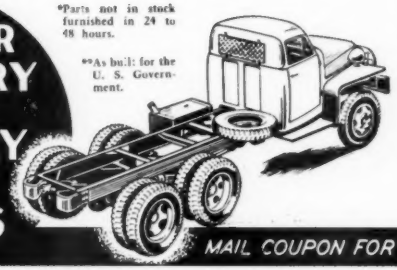

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STUDEBAKER-REO

	NET PRICE
667247 Leaf, No. 1 and 2 (main) Rear Spring	$2.85 each
667251 Leaf, No. 1 Front (includes bushing)	2.50 each
667252 Leaf, No. 2 Front (wrapper leaf)	2.00 each

GMC

2145608 Leaf, No. 1 and 2 (main) Rear Spring	$2.85 each
2145619 Leaf, No. 1 Front (includes bushing)	2.50 each

COMPLETE SPRINGS

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through 1/2-in. choke. Completion test on lower perforations at 8,965-90 ft. were scheduled this week.

Wood County.—Two miles north of Hawkins, Hollandsworth Oil Co. 1 Paul H. McKnight, W. R. James Survey, A-335, was coming out of the hole with core from below 4,565 ft. A core from 4,534-65 ft. recovered ashy sand which had approximately 1 ft. of oil stain. Sample top on the sub-Clarksville was 4,553 ft., on elevation of 346 ft.

Sohio Petroleum Co. 1 G. T. Turner, David Gilleland Survey, confirmation well in Pine Mills field, perforated at 4,798-4,810 ft. in the sub-Clarksville, and completed for an initial production of 153 bbl. of 27°-gravity oil in 24 hours, through 1/4-in. choke. Flowing tubing pressure was 60 psi. Gas-oil ratio was 300 cu. ft. Total depth was 5,656 ft., plugged back to 5,577 ft.

EAST TEXAS (DISTRICTS 5, 6 AND 6-P) WILDCAT FAILURES

Houston County: Geiser-Jackson, Inc., 1 H. W. Bishop, Wm. Stokes Sur., 3 mi. N Grapeland, dry, TD 6,211 ft.

Kaufman County: White & Webb Drilling Co. 1 Mrs. Lettit Fox, Ralph Gilpin Sur., 1 1/2 mi. SE Ola, 2 1/2 mi. NW Walter Fair field, dry, TD 4,943 ft., elev. 541 ft., Austin chalk 2,485-2,710 ft., Woodbine 3,195 ft., by samples.

Robertson County: Van Oil Co. 1 Tom Peyton, Wm. Henry Sur., Sec. 168, 7 mi. N Bryan, dry, TD 1,300 ft., elev. 318 ft.

Vickery, McDowell & Artusy 1 R. H. Seale est., Thomas J. Wooten Sur., A-55, 10 mi. N Bryan, dry, TD 4,026 ft., elev. 360 ft., Midway 3,178 ft., by samples.

Wood County: B. F. Phillips, Jr., 1 John Shearer, Polly Tier Sur., 8 mi. SE Winnsboro, dry, TD 6,405 ft., elev. 472 ft., base Austin 4,123 ft., top Woodbine 4,490 ft., Comanche 5,050 ft., Paluxy 6,220 ft., no shows.

SOUTH LOUISIANA

Wilcox Discovery Fails To Find Deeper Pay Zone

NEW ORLEANS.—The new Wilcox oil discovery 1 mile north of Big Island field, Rapides Parish, gaged 195 bbl. of 48°-gravity oil in 12 hours on preliminary test through 7/32-in. choke. The well, Union Producing Co. 1 Hudson, was drilled to 10,225 ft. and plugged back to 5,615 ft. after attempts to find oil at lower depths had failed. Production is from the Wilcox zone through perforations at 5,565-67 ft. The sand in the Wilcox is reported to be 29 ft. Regular production in the nearby Big Island field is from the Tuscaloosa sand at round 9,560 ft. The well is waiting on state potential.

Union Producing Co., M. H. Marr and associates are reported to have staked both east and west offsets to the 1 Hudson. East offset will be 1 Oscar Morace, C NE NE 11-4n-3e, while the west offset will be the 1 Cyril Beauroeuf, C NE NW 11-4n-3e.

Humble Oil & Refining Co. has finaled the 1 Marrero Land & Implement Association for 159 bbl. of 31.2°-gravity oil daily through 9/64-in. choke. The well marks discovery of a new sander in Avondale field, Jefferson Parish. Total depth of the well is 9,345 ft. and is producing through perforations at 7,750-53 ft. This is Humble's second try in the field. The 1 Texas & New Orleans R.R., discovery well for the field, was completed in June of this year for 130 bbl. of 31°-gravity oil through perforations at 8,183-88 ft. Avondale field is approximately 10 miles from New Orleans and approximately 4 miles directly west of Westwego.

Magnolia Petroleum Co. has completed a second gas well on Block 72 off Terrebonne Parish, with an estimated flow of 35,000 M.c.f. gas daily. The new gasser, A-2 State Lease 766, is producing through perforations at 6,936-45 ft. and 6,953-58 ft. The well is now shut in and the rig is being torn down preparatory to moving back to the Block 125 location where a dry hole was recently drilled.

SOUTH LOUISIANA WILDCAT FAILURES

Allen Parish: Bel Oil Corp. 1 Quatre Parish Co., 3-5s-6w, 13 mi. NW of Kinder, dry, TD 9,019 ft.

Beauregard Parish: Cox & Hamon 1 Long Bell Lumber Co., 10-4s-8w, 5 mi. E-NE of Bannister, dry, TD 9,824 ft.

Cameron Parish: Sohio Petroleum Co. and Sun Oil Co. D-1 Miami Corp. 7-14s-6w, dry, TD 13,311 ft.

LaFourche Parish: Placid Oil Co. and Union Oil Co. of Calif. 1 City of New Orleans, 18-23s-23e, 1 1/2 mi. N of Bay Marchand Dome, dry, TD 12,241 ft.

You can get a good Cement Job while protecting a Low-Pressure Zone below
A Baker Triplex Cement Baffle Collar, installed a joint or two above the shoe, serves as a stop for the cementing plug. B A hold-down strap retains Baker Metal Petal Basket against the "TRIPLEX" Shoe while running-in C Cementing Ports are covered by Tripping Valve until cementing is commenced. E After reaching the desired point in the hole, circulation is established through central passageway. A Tripping Ball is pumped down the hole to seat upon the Tripping Valve. Pressure is applied to shear the Tripping Valve shear screws and force the Tripping Valve downward to expose the cementing ports. F Shearing these screws also releases the Basket hold-down strap and allows the Metal Petal Basket to expand against the walls of the hole D A resilient rubber, sleeve-type, back-pressure valve opens readily (see dotted white line) to permit passage of slurry into annulus above. Cementing then is carried out in conventional manner with cement slurry directed upward by the exclusive Baker "Whirling" action. Only readily drillable materials are used for all internal parts.—Look in your BAKER (or Composite) CATALOG, or write to BAKER OIL TOOLS, INC., at Houston, Los Angeles, or New York for complete information.
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TEXAS GULF COAST

New Field Opened in Jefferson County Area

HOUSTON.—A new Texas Gulf Coast oil field has been opened in the Big Hill area of Jefferson County. The J. C. Wynne & Associates 1 Fitzhugh, William McFadden Survey, flowed 242 bbl. of oil daily through a 10/64-in. choke through perforations at 4,980-86 ft. The well was originally drilled to 5,540 ft., but was plugged back and drilled in sidetracked hole to 5,247 ft. It is reported to be flowing from the lower Miocene formation.

Hewit & Dougherty have completed the B-1 K. D. Roche for a new discovery 6 miles northeast of Skidmore, Bee County. The well was drilled to a depth of 5,420 ft. and 5 1/2-in. casing set at 4,515 ft. Through perforations at 4,236-47 ft. the well flowed 50,000 M.c.f. gas per day on open flow with the shut-in pressure at 1,800 psi. The new gas discovery is located in the Timothy Hart Survey.

An extension to Coletto Creek field, Victoria County, has been completed by Rock Hill Oil Co. 2 C. P. Marthiljohni, Jr. The well was drilled to a depth of 5,023 ft. and is producing 107 bbl. of oil daily through an 1/4-in. choke, through perforations at 4,341-43 ft. This south extension is located in the R. Manchola Grant, Abstract 87.

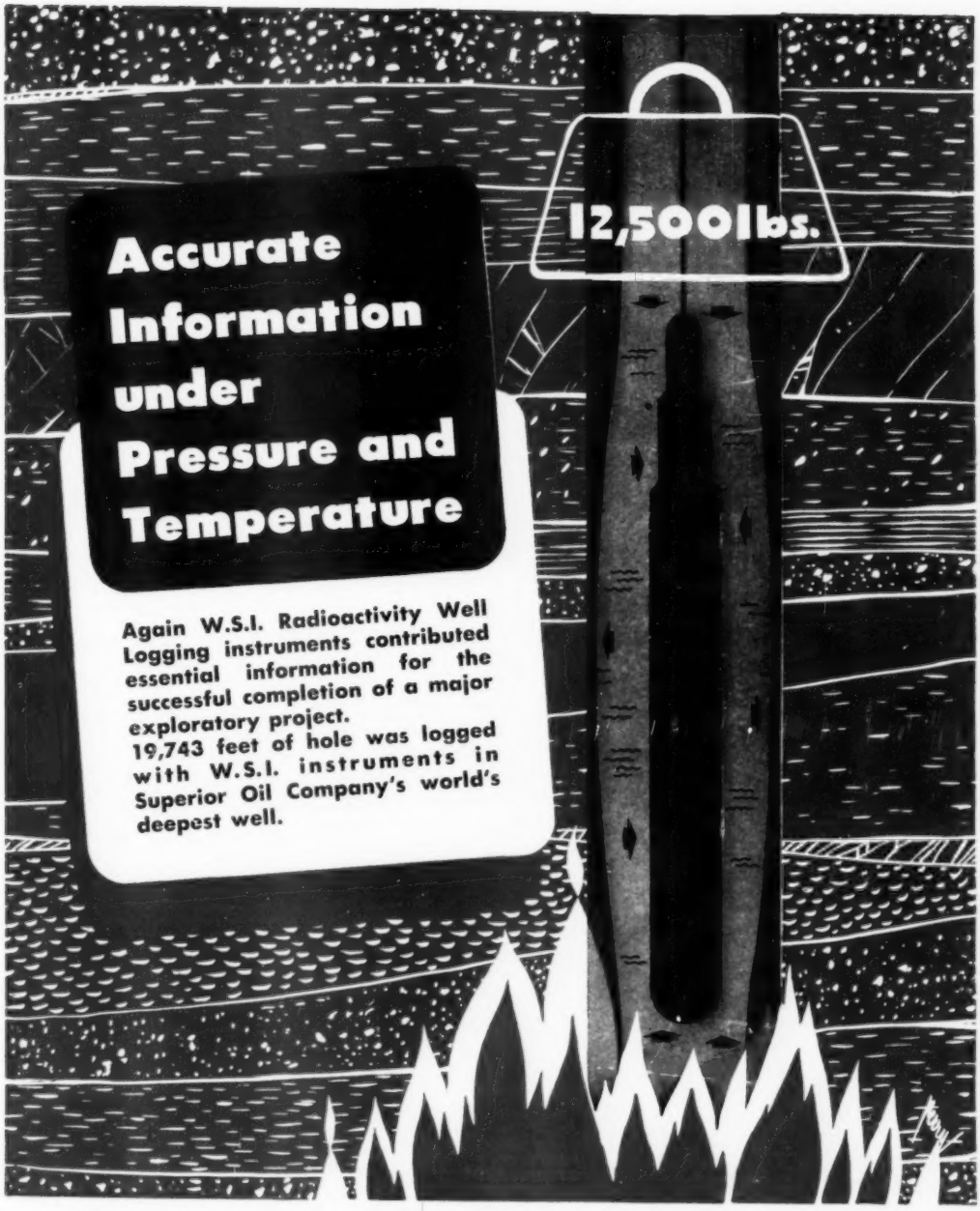
Production Service Co. has opened a new gas field in Lavaca County with completion of 1 Lafey Miller. The well flowed dry gas through perforations at 6,080-105 ft. with 2,350 psi. working pressure. The new discovery is located in the A. S. White Survey, Abstract 46, 5 1/2 miles southeast of Speaks field and 4 1/2 miles southwest of Provident City field. It has been designated "Seclusion" field.

Wesley West and J. M. West, Jr., are perforating to make test on 1 West Securities Co. and Texas Long Leaf Lumber Co., wildcat, 3 miles southeast of Goodrich in Polk County. The well showed slight indications of oil and gas on drill-stem test at 3,342-66 ft. It is located in the A. Viesca League, Abstract 77, approximately 1 mile east of Abercrombie 1 Barnes, oiler.

The 30 new locations on the Texas Gulf Coast include 6 wildcat starts, 1 each in Hardin, Matagorda, Montgomery, and Wharton counties, and 2 in Jackson County. There were two successful exploratory tests completed during the week, one each in Bee and Calhoun counties, while three were dry, one each in Refugio, Brazoria, and Matagorda counties.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Bee County: Gas discovery—Hewit & Dougherty B-1 K. D. Roche, Tomothy Hart Sur., 6 mi. NE of Skidmore, top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of Vicksburg 4,750 ft., TD 5,420 ft., perf. 4,236-47 ft., IP: 50,000 M.c.f. gas daily on open flow, SIP 1,800 psi.

Calhoun County: New oil pool—John W. Mecom 4 Minnie S. Welder, 2 mi. SW of Heyser field, Jose Maria Rios Sur., A-32, 4½ mi. SW of Bloomington, top sand 5,898 ft., TD 8,203 ft., perf. 5,898-906 ft., IP: 131 bbl. oil daily, GOR 1,520, TP 1,100 psi., grav. 33°.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Brazoria County: Superior Oil Co. 1 E. W. Brown, Perry and Austin Grant 25, A-112, 9 mi. W of West Columbia, 1 mi. S of Pledger gas field, dry, TD 9,241 ft.

Matagorda County: G. S. Hinkle 1 F. Cornelius Sr., J. H. Scott Sur. A-86, 2 mi. E of Midfield and 3 mi. SW of Markham production, dry, TD 9,571 ft.

Rerugio County: Hewit & Doughery J-1 F. B. Rooke & Sons, Antonio de la Vina Sur., A-44, 1 mi. NE of Roche field, 3 mi. SW of Woodsboro, dry, TD 6,950 ft.

CALIFORNIA

Play Active Southeast Of Cuyama Valley Field

LOS ANGELES.—While tests northwest of Cuyama Valley, especially in the Carrizo Plains area, have not been encouraging so far. Showings to the southeast are sparking a fairly active drilling campaign.

The first southerly step from Russell Ranch production brought in South Cuyama field about 7 miles from original production. Bolsa Chica Oil Corp. and Pacific Supply Cooperative then drilled 1 Hickey, 30-9n-24w, about 12 miles to the southeast. This test reached 6,819 ft. and has been suspended without report since August. Leasing has been active in this area and Richfield Oil Corp. now has four tests drilling here.

One Richfield test offsets the Bolsa Chica well. This is 1 Dixon A in Section 25-9n-25w. This test is some 400 ft. higher elevation than 1 Hickey. It is now drilling beyond 2,600 ft., with 13⅜-in. casing set at 351 ft. The Hickey well has 12¾-in. casing set at 273 ft.

The other three tests continue the southeast trend for about 10 miles. The 1 Quatal Unit, 34-9n-24w, has set 13⅜-in. casing at 302 ft. and is drilling beyond 2,500 ft. In Section 22-8n-24w, 1 Apache Unit has reached 5,677 ft. with a fish at 5,622 ft. The most southerly of these tests is 1 Round Springs Unit, 32-8n-23w. Location has been set and grading is completed.

In the Ozena district, 25 miles southeast of South Cuyama field and 4 miles beyond the Richfield tests, Cal-Nevada Oil Co. has set location for 1 Behr, 22-7n-23w. In 18-7n-23w, C. W. Colgrove is drilling at 2,800 ft. in his 54-18 Wright. These tests and the last two of Richfield carry the play into Ventura County.

Records show two previous tests in this area, both dry. The deepest of these is No. 1 of the Ozena Oil Co., drilled in 1926 to 3,562 ft., 10-9n-24w, the other, No. 1 Adams Drilling Co., bottomed at 2,207 ft. in Section 2-9n-24w, prior to 1925.

South of Lost Hills field and east of North Belridge, 45 Van Sicklin of Standard Oil Co., is testing. The well is bottomed at 14,597 ft. Casing has been gun perforated at 12,590-12,650 ft. The hole is being cleaned out following squeezing operations.

Robert S. Rocco has reentered the 1 D & C, formerly of Warren Deuel and Ralph E. Cowley. The well has been idle since November 1948 at 3,500 ft. Location is 36-4n-16w, about ½ mile west of "Confusion Hill" at Placerita. Indications are that the hole will be deepened.

Formation tests on Humble Oil & Refining Co.'s Paloma wildcat have not been successful so far. With bottom at 11,578 ft. the test topped "L" at 10,434, "MM" at 11,048, Symons at 11,211, and the Paloma sand at 11,524 ft. Packer failed on test at 11,563-78 ft. Test at 11,567-78 ft. recovered 15 ft. of rotary mud in 22 minutes.

Barnsdall Oil Co. has abandoned its Coalinga test at Amarada Nose at 9,703 ft. A strong blow from 9,023-96 ft. brought 1,170 ft. of mud and water in 3 minutes. The hole was deepened and cored at 9,435-45 ft. with recovery of 7 ft. of gray sand. Location 28-19s-16e, 1 JM & R.

CALIFORNIA SUCCESSFUL WILDCAT

Kern County, McVan area: General Drilling Co. C-8 Fitzhugh USL, 14-27s-27e, 120 bbl. of 18°-gravity oil per day from upper Vedder topped at 3,167 ft., gray lower Vedder 3,343 ft., elev. 955 ft., TD 3,610 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Devils Den area: The Texas Co. 1 Capital Co. Three, 19-25s-19e, dry, TD 5,987 ft., elev. 480 ft.

San Luis Obispo County, LaPanza area: Yellowstone Oil Co. 2 Lewis, 25-29s-16e, dry, Painted Rocks 295 ft., TD 335 ft. in gray sand, elev. 1,770 ft.

Santa Margarita area: Humble Oil & Refining Co. 2 Santa Margarita Land & Cattle Co., 36-32s-19e, dry, TD 2,692 ft., elev. 3,010 ft.

OKLAHOMA

Prue Sand Production Found In Lincoln County Wildcat

ANOTHER new pool for Lincoln County is indicated in the area 5 miles south and a little east of Stroud where O. F. Warren is testing showings encountered in the Prue sand in his 1 Goff, SE NE SE 23-14n-6e. Saturated sand is at 2,953-75 ft., to which hole was plugged back from a total depth of 3,066 ft., with 7-in. oil string run to 2,952 ft. Following a 20-qt. shot in open hole, the well bailed 5 bbl. of clean oil per day. An additional shot of 180 qt. has been made in an effort to increase production.

Carter Oil Co. 1 Taylor, C SE NW 36-2n-2w, in the northwestern part of the Katie pool, Garvin County, flowed at an estimated rate of 25 bbl. of oil per hour and 750,000 cu. ft. of gas per day in a drill-stem test of the Hoxbar sand at 5,562-75 ft. Following the test, 700 ft. of 42.5° oil was recovered. Although showings have been encountered in this zone in other wells in the area, these have indicated high-ratio production, and no attempts have been made to complete any wells in it. Other wells in the area produce from the Deese sand, to which the Carter well probably will be drilled as it offsets production in that zone.

Sterling Oil Co. 1 Lohaus, SW SE NW 21-17n-5e, 4 miles south of Cushing in Lincoln County, and a mile north of oil production in the North Agra pool, flowed an estimated 1,000,000 to 2,000,000 cu. ft. of gas per day while testing Bartlesville sand at 3,538-90 ft. In a previous drill-stem test of this zone, a recovery of 80 ft. of oil-cut mud was made, indicating a possible new oil pool. The well is ¾ mile north of gas production. In the meantime, hole has been drilled to 4,090 ft. in Simpson dolomite, and plugged back.

OKLAHOMA SUCCESSFUL WILDCATS

Creek County: H & M Development 1 Fisher, NW NW SE 31-15n-10e, pumped 8 bbl. of 38°-gravity oil per day from Red Fork at 2,205-25 ft., TD 3,424 ft.

Garfield County: Oliphant 1 Hoover, NE SW SE 2-24n-5w, flowed 256 bbl. of 46°-gravity oil per day from Marshall at 6,204-18 ft., TD; Layton 4,420 ft., Oswego 4,920 ft., Mississippi lime 5,495 ft., Woodford 6,066 ft., Viola 6,138 ft., dolomite 6,148 ft., first Wilcox sand 6,161 ft.

Major County: Andrade III 1 School Land, NE SE NE 36-22n-11w, flowed 102 bbl. of 38°-gravity oil per day from Manning at 6,790-6,900 ft., TD 6,943 ft.

Okfuskee County: New pay in Southeast Blakely—Mid-Continent 7 Weehunt, NW NE SE 6-11n-11e, 1,300,000 cu. ft. of gas from perf. in Misener at 3,661-72 ft., TD 3,760 ft.; Gilcrease zone 2,690 ft., Gilcrease sand 2,842 ft., Wapanucka 2,957 ft., Cromwell 3,077 ft., Viola 3,772 ft., sandy dolomite 3,817 ft., Wilcox 3,823 ft.

Payne County: Morgan et al., 1 Cundiff, SW SW NE 31-18n-2e, pumped 40 bbl. of oil per day from Skinner at 4,313-30 ft., TD.

Seminole County: Keener Oil & Gas 1 Norvell, SW SW NW 20-7n-7e, flowed 102 bbl. of 44°-gravity oil per day from Calvin at 1,774-84 ft., TD 24/64-in. tubing choke.

OKLAHOMA WILDCAT FAILURES

Caddo County: Hester & Hester 1 Melcher, SW SW SE 14-5n-12w, dry, TD 774 ft., lime 600-06 ft. with slight show of oil.

Cotton County: Nagle 1 Day, NE NW NW 13-5s-12w, dry, TD 2,676 ft., brown lime 2,631 ft., hard lime 2,656 ft., no shows.

Garvin County: Carter 1 Evans, SE SW SE 5-2n-1w, dry, TD 5,406 ft.

Grant County: Sinclair Oil & Gas 1 Hendrixson, NW SE NW 17-29n-8w, dry, TD 5,660 ft., Panhandle-Big lime 900 ft., Chase 1,514 ft., Foraker 2,123 ft., Lecompton 3,210 ft., Oread 3,522 ft., Lowell 3,820 ft., Tonkawa 3,830 ft., upper Layton 4,160 ft., Oswego 4,443 ft., Mississippi chat 4,771 ft., Mississippi lime 4,804 ft., Woodford 5,220 ft., Viola 5,287 ft., dense 5,313 ft., dolomite 5,322 ft., Wilcox 5,342 ft., Arbuckle 5,581 ft.

Hughes County: Murta 1 Darks, NE NE SW 19-9n-11e, dry, TD 3,218 ft., Booch 2,140 ft., Hartshorne 2,275 ft., Gilcrease 2,473 ft., Union Valley-Cromwell 3,005 ft., second Cromwell 3,105 ft., Jefferson sand 3,174 ft.

Logan County: Jordan 1 Counts, SW SW NE 27-15n-1e, dry, TD 5,536 ft., Hogshooter 3,822 ft., Layton 3,850 ft., Checkerboard 4,110 ft., conglomerate 4,145 ft., Big lime 4,520 ft., Oswego 4,615 ft., basal Pennsylvanian-Woodford 5,050 ft., Hunton 5,068 ft., Sylvan 5,165 ft., Viola 5,270 ft., Wilcox 5,450 ft., second Wilcox 5,524 ft.

Okfuskee County: Fleming 1 Bird, SW NE SW 32-10n-11e, dry, TD 2,585 ft., Gilcrease 2,584 ft.

Foster 1 Curry, NW SW NW 25-13n-8e, dry, TD 4,228 ft.

Mid-Continent 1 Parsons, NW NW SW 6-13n-9e, dry, TD 3,299 ft. in shale, sandy lime 3,230 ft., sandy lime and shale 3,245 ft., sand 3,255 ft., hard white lime 3,275 ft.

Mid-Continent 1 Stormont, NE SW SW 23-13n-10e, dry, TD 3,490 ft., brown lime 2,295 ft., Booch 2,305 ft., Gilcrease 2,690 ft., Wapanucka 2,695 ft., Union Valley 2,780 ft., Cromwell 2,790 ft., Mayes 2,985 ft., Woodford 3,270 ft., Hunton 3,305 ft., Sylvan 3,316 ft., Viola 3,390 ft., dense 3,408 ft., dolomite 3,415 ft., Wilcox 3,433 ft.

Payne County: Blackwell 1 Leach, SE SE SE 22-19n-5e, dry, TD 2,915 ft.

O'Rourke & Baker 1 DeWitt, SE SW SE 27-20n-4e, dry, TD 4,055 ft., lime 3,540 ft., Mississippi lime 3,824 ft., Woodford 3,913 ft., Misener 3,949 ft., Viola 3,962 ft., Wilcox 3,999 ft., second Wilcox 4,034 ft.

Pittsburg County: Intex 1 Southard unit, C NW SE 34-6n-15e, dry, TD 1,559 ft., broken sand 1,284 ft.

Consolidated 1 Free, SW SW NW 31-7n-15e, dry, TD 3,500 ft., Hartshorne 3,305 ft.

Stephens County: Davenport 1 Mann, SW SW SW 28-2s-6e, dry, TD 2,555 ft. in Viola, sand 1,782 ft., 1,794 ft., 1,921 ft., and 2,026 ft., all water.

Atkinson 2 Pace, NW NW NW 11-3s-6w, dry, TD 2,507 ft., Hoxbar 1,180 ft., lime 1,390 ft., sand 1,720 ft., lime 2,245 ft., sand 1,960 ft., 2,010 ft., and 2,150 ft., all water.

N. CENTRAL TEXAS

Farris Finds Gas; Stakes East Offset

WICHITA FALLS.—Farris Oil Co. of Fort Worth completed its 1 J. B. Culwell, located on a 40-acre lease in the J. Herndon Survey, A-617, 2½ miles southwest of Springtown in northern Parker County, as a shut-in gas discovery from the Caddo. Initial potential was 11,000,000 cu. ft. of gas a day, after treating with 2,000 gal. of acid through 136 holes in casing from 3,574-3,608 ft.

The same operator staked location for 1 J. P. Hart heirs 1,700 ft. east of the 1 Culwell, but in the Ezeckial A. Fleming Survey. Both locations are about 2 miles south of the 1 Darrell O'Neal, small Ellenburger discovery completed in September from pay topped at 6,628 ft. Proposed depth for the 1 Hart was 3,650 ft.

Montague County.—Four miles northwest of Montague, Konrad Sztykgold 1 R. S. Whitecotton, H. Ravenstone Survey, A-638, set 5½-in. casing at 6,310 ft. with 250 sacks and was waiting on cement.

New locations included S. D. Johnson's scheduled 5,200-ft. semiwildcat, 6 miles northwest of Bowie and west of production in Hults-Owens field. Location is 1,320 ft. from south and east lines, Section 2,820, TE&L Survey.

R. C. Lipscomb staked location for 1 G. R. Breeze, wildcat test 2 miles northeast of Dodson field and 5 miles east of Nocona. Location is 3,750 ft. from west and 2,553 ft. from south lines, A. J. Miller Survey, A. 491. Proposed depth is 5,200 ft., with rotary.

Russell Maguire was building roads into a location 1½ miles northeast of Lewis-Stuart field. It is to be the 1 J. M. Pyles, 330 ft. from north and west lines of lease, of the J. T. Gibson Survey, A-311. Contract depth was 6,500 ft.

Archer County.—K & G Production Co. 1 Floyd Carter, Block 6, McKinney & Williams Survey, 4 miles west of Mankins field and 1 mile southeast of Dundee, set 5½-in. casing at 4,592 ft., and prepared to test a sand at 4,495-4,502 ft.

Young County.—Location was made for a 4,000-ft. cable-tool wildcat by Neal Elder, of Graham, as the 1 Crumpton & Williams, located 1,000 ft. from north and 600 ft. from west lines, T. H. Woodley Survey, A-1654. It is 6 miles southeast of Bunger and 2 miles south of Herron City field.

Dillard & Waltermire 1 M. K. Graham, Section 3,410 ft., TE&L Survey, 11 miles west of Graham, recovered 60 ft. of oil-cut mud and 30 ft. of salty mud on a 90-minute drill-stem test in sand from 2,689-95 ft. Bottom-hole pressure was 800 psi. in 15 minutes. A second test from 2,695-2,701 ft., open 1 hour, recovered 240 ft. of salty mud and 30 ft. of salt water. It was drilling ahead below 2,832 ft. in shale.

Jack County.—Mid-Continent Petroleum Corp. 1 B. Zuber, wildcat in the J. N. Kirkpatrick Survey, A-1128, 4 miles southeast of Post Oak, drilled conglomerate showing oil from 5,787-93 ft. A drill-stem test from 6,794-99 ft., open 30 minutes, recovered 60 ft. of slightly gas-cut mud. It was drilling ahead.

Russell Maguire filed application for the 1 Dora Shawyer, 330 ft. from north and west lines, southwest quarter, Joseph Turner Survey, A-609. The proposed 5,000-ft. test is 3½ miles northeast of Perrin and about 4 miles southeast of Worsham-Steed field.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Fisher County: A. G. Hill and Walter Cuncan 1 W. P. Bomar, T. H. Cosby Sur. 315, 3 mi. E Roby, TD 3,580 ft., elev. 1,918 ft., Cook lime pay 3,556-80 ft., pumped 176 bbl. of 42°-gravity oil a day, 40 per cent salt water.

Parker County: Farris Oil Co. 1 W. J. B. Culwell, J. Herendon Sur., A-617, 2 mi. SW Springtown, TD 4,002 ft., top pay 3,574 ft., PB 3,644 ft., flowed 11,000,000 cu. ft. of gas daily, Caddo perf. 3,574-3,608 ft.

Wichita County: Southern Petroleum Exploration, Inc. et al 1 R. Lee Kempner, 80-5-SPRR Sur., 4½ mi. NW Holliday, TD 4,330 ft., elev. 1,045 ft., Caddo 4,300 ft., perf. 4,305-28 ft., pumped 122 bbl. of 44°-gravity oil and 20 bbl. water daily, GOR 300 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Bridwell Oil Co. 1 L. P. Jones, Sec. 1898, TE&L Sur., A-578, 8 mi. E Anarene, dry, TD 4,094 ft.

Jennings Drilling Co. 1 T. H. Coleman, Blk. 25, Brazos CSL, 4 mi. N Scotland, dry, TD 3,973 ft.

Clay County: D. H. Bolin 1 Mary Gremminger, Lot 70, Blk. 2, Clark & Plumb Sur., 2 mi. SE Windthorst, dry, TD 3,764 ft.

Cooke County: W. H. Rouzer 1 P. Hensel, J. Taylor Sur., A-1007, 1½ mi. SW Era, dry, TD 1,296 ft., Ellenburger 1,278 ft.

Coryell County: Amerada Petroleum Corp. 1 N. F. Tate, approximately 455 ft. from W. 610 ft. from N lines, Walter Campbell Sur., A-1155, 1 mi. E Ireland, dry, TD 4,848 ft., elev. 984 ft., Strawn 560 ft., Smithwick 2,200 ft., Marble Falls 2,965 ft., Ellenburger 3,433 ft.

Jack County: Wrightsman Oil Co. 1 W. J. Dees, Geo. Taylor Sur., A-843, 1½ mi. SW Vineyard, dry, TD 5,211 ft., elev. 935 ft.

Montague County: North American Oil Consolidated 1 J. M. Pruitt, S. E. Clements Sur., A-157, 5 mi. SW St. Jo, dry, TD 6,698 ft., elev. 990 ft.

Taylor County: E. H. R. Sabens 1 E. L.

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Hamilton, 33-16-T&P, 3 mi. W Abilene, dry, TD 2,642 ft.

Throckmorton County: W. W. Yarbrough 1 D. S. McDonald, Sec. 2227, TE&L Sur., 1 mi. SW Woodson, dry, TD 725 ft.

Wichita County: J. W. Hastings 1 B. K. Nolen, John Thomas Sur., A-283, 5 mi. NW Wichita Falls, dry, TD 3,330 ft.

APPALACHIAN FIELD

Wood County, W. Va., Test Proves Large Gas Well

PITTSBURGH.—In Steele district, Wood County, West Virginia, the largest Oriskany sand wildcat test in recent months was brought in. Clarence W. Meadows, Trustee, 1 C. A. Barnette gaged 20,000,000 cu. ft. gas natural. Rock pressure 1,875 psi. in 96 hours. Total depth was 5,360 ft. This well is in the vicinity of the Waterbury discovery well in Grant district, Jackson County, which was completed early last year.

In Dry Fork district, Tucker County, Cumberland & Allegheny Gas Co. 1-A-425 Jason Harmon, elevation 3,304 ft., is drilling at 6,135 ft.; in Clay district, Hancock County, John T. Galey 1 Karol & Catherine Sobel, elevation 1,066 ft., is drilling at 1,275 ft.; in Portland district, Preston County, Hope Natural Gas Co. 9391 John & Edna Murphy, elevation 2,152 ft., is drilling at 3,470 ft., and Snee & Eberly 2 Cora E. Lewis, elevation 1,953 ft., is drilling at 4,325 ft.

In Derry Township, Westmoreland County, Pennsylvania, Peoples Natural Gas Co. 4,3814 Camilla Giffen is still in difficulty in a bad hole condition and only a slight advance was made in drilling which is now at 9,025 ft. In Wharton Township, Fayette County, William E. Snee et al are cementing at a depth of 6,768 ft. in their 3 Indian Creek Coal & Coke Co. A similar job is being done at 6,286 ft. by Orville Eberly et al in the 1 N. E. Murphy, Georges Township. In Napier Township, Bedford County, South Penn et al Jesse B. Miller is drilling at 5,341 ft., elevation 1,666 ft.

WEST VIRGINIA SUCCESSFUL WILDCAT

Wood County, Steele district: Clarence W. Meadows, Tr., 1 C. A. Barnette, 20,000,000 cu. ft. of gas, natural, rock pressure 1,875 psi. in 96 hours, Corniferous lime 5,222 ft., Oriskany sand 5,341 ft., gas 5,344 ft. and 5,352-60 ft., TD 5,360 ft.

ROCKY MOUNTAIN

Deep Tertiary Test Apparently a Failure

DENVER.—Stanolind Oil & Gas Co. is continuing to test Dakota sand at its deep Canyon Creek test, Sweetwater County, Wyoming. The well is 1 Unit C, NE NW 3-12n-101w, and was drilled to 13,321 ft., total depth, with Dakota top at 13,108 ft. Cores in the Dakota had shown gas and the operator ran liner to the top of Dakota prior to testing. Although complete results of the test are not available, Stanolind reports that the well's strongest flow showed only 1,200,000 cu. ft. gas and flowing pressures diminished on the test. The operator is continuing to clean out but apparently the well is a failure in the Dakota. This wildcat is of importance as the first of several planned for large Tertiary structures in the Vermillion Creek area along the Wyoming-Colorado line.

Farmers Union Central Exchange of Billings is swabbing 8 bbl. oil per hour from its 1 Shad, SE SE SE 6-43n-91w, Hot Springs County, Wyoming. The well was drilled to 5,210 ft. total depth in the Madison, which made water and was plugged back for completion through casing perforations opposite Tensleep found at 4,364 ft. The wildcat is located on the southeast side of the Big Horn Basin and it is not likely that there will be additional drilling on the structure until next spring. Oil found in the Tensleep in this well is 32° gravity.

Ohio Oil Co. has announced location for its second wildcat well in the western Nebraska play where the company made a first Dakota sand discovery last May. The new well is in the Huntsman area at 1 Cruise, NW SW SE 7-14n-49w, 3 miles north of the town of Sidney and 6½ miles southwest of the Gurley pool. At Gurley, Ohio now has four Dakota-sand wells making approximately 850 bbl. of light oil daily, and the company has completed three Dakota sand failures. The producing area at Gurley is considered small. Ohio and other operators holding blocks throughout the Denver Basin are continuing to take acreage throughout western Nebraska and northeastern Colorado counties and conducting a seismic campaign in the area.

New locations.—There were 27 new locations, with 15 in Wyoming, 8 in Montana, 2 in Colorado and 1 each in northern New Mexico and Nebraska. In Wyoming, Trigood Oil Co. is building road to its deep wildcat in the McCullough Peak area, northeast of the town of Cody and north of the Oregon Basin fields, Park County. The test is located in the SE NW SW 21-54n-100w and is on a seismic high with the objective at depths below 10,000 ft. Wm. Hamm, Jr., of St. Paul, Minn., is moving in for a 5,300-ft. wildcat in the West Stroner area at 1 Government, SW NW SW 27-55n-69w, Campbell County. This is Hamm's first Rocky Mountain drilling. In the Big Sandy area Bill Tomberlin of Casper has made location on a farmout block from The Texas Co. in the Big Sandy area at 1 Government, C SW SE 5-45n-90w, for a Frontier sand test. Gardner Bros. of Dallas have made location for a 3,500-ft. test to granite on a farmout block from Carter in the Chimney Creek area, Routt County, Colorado.

Completions.—There were 47 completions, with the majority of these shallow-pool wells in the Cut Bank and Kevin-Sunburst fields of Montana. Of the 18 completions in Wyoming there were 5 wildcat failures and 1 gas discovery. The five wildcat failures were located in the current Crook County play, on the east side of the Powder River Basin. Included in the failures was Texas' Stroner Unit which went into Morrison at 4,610 ft. total depth. Husky Refining Co. and Continental Oil Co. completed their Dakota sand gas discovery at Salt Wells, Sweetwater County, for a gage of 12,625,000 cu. ft. of gas daily. The well is 4 miles from Montain Fuel Supply Co.'s gas line into Rock Springs and the Salt Lake City area and lines will probably be laid from the well next year to market this gas. In Montana, Texas completed its Whitewater Unit wildcat at 5,894 ft., total depth, in Cambrian. The company's Loredo Prospect, Hill County, was also abandoned with no shows reported through Cambrian.

WILDCAT FAILURES IN WYOMING

Sage Basin, Carbon: Shell Oil Co. 1 Rawlins, C SE SE 27-17n-88w, 2,096 TD; abnd., no data released.

Deer Creek, Crook County: Central States Drilling 1 McKean, NW NE SW 25-51n-67w, 2,827 TD; abnd.; Dakota 310, Fuson 490, Lakota 560, Morrison 610, Minnekahta 1,810, Opeche 1,840, Minnelusa 1,880, Madison 2,790.

Oshoto area, Crook County: Buffalo Drilling Co. 1 Govt., C NW NE 28-53n-68w, 5,690 TD; abnd.; Muddy 5,332, Dakota 5,584.

Pine Ridge: Lewis & Wolff 2 Barton, NW

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NW NE 34-50n-65w, Crook County, 175 TD; abnd.; flowed 10 gal. water per min., Lakota 170.

Stroner Unit, Crook County: The Texas Co. 1 Unit, NE SW SW 24-55n-68w, 4,610 TD; abnd.; Niobrara 2,360, Beaver Creek 2,408, Carlisle 2,880, Frontier 2,975, Mowry 3,670, Muddy 4,070, Dakota 4,328, Lakota 4,510, Morrison 4,582.

WILDCAT FAILURES IN MONTANA

Loredo Prospect, Hill County: The Texas Co. 1 A. L. Kiemele, SE NW NE 26-31n-13e, 5,447 TD; abnd.; Glaggett 975, Eagle 1,070, Colorado 1,215, Bow Island 2,644, Kootenai 2,805, Ellis 3,190, Basal Ellis 3,443, Madison 3,540, Three Forks 4,190, Potlatch 4,410, Jefferson 4,468, Cambrian 5,310.

Cassady Structure, Hill County: Midwest Drilling 1 Schnitzmeier, SE SW NE 14-35n-16e, 4,140 TD; PB 4,058; abnd.; Ellis-Madison 4,076.

Lothair Nose, Liberty County: L. B. O'Neil 1 Kolstad, C NE SW 29-31n-4e, 2,202 TD; abnd.; Blackleaf 740, Sunburst 1,885, Ellis 2,040, Madison 2,200.

Whitewater, Phillips County: The Texas Co. 1 Govt., C SE SE 11-34n-31e, 5,894 TD; abnd.; Colo. 674, Kootenai 2,350, Morrison 2,460, Ellis 2,675, Gypsum Springs 2,945, Charles 3,245, Madison 3,305, Bannif sand 4,140, Three Forks 4,193, Potlatch 4,220, Jefferson 4,256, Ordovician 5,324, Cambrian 5,884.

MICHIGAN

Allegan County Wildcat Tests Traverse Pay

MOUNT PLEASANT.—A shallow Traverse zone wildcat in Allegan County was showing an encouraging pay horizon this week. Pascal F. Broughton 1 Andrus, NW SW NE 15-1n-16w, Casco Township, carried 800 ft. of fluid, natural, in 20 hours. Most of the fluid was oil but some water was reported. Traverse lime was picked at 1,162 ft. and pay was drilled at 1,163-64 ft. where drilling operations were halted. The production horizon was tapped before 5-in. casing had been set and that operation, with pipe run at 1,162 ft., was in progress prior to further tests.

Broughton's new strike is located approximately midway between Hawkhead Traverse pool, opened in 1946, and Pullman field, discovered this year, both in the same township. Acreage around the new strike is controlled by Broughton and W. Spencer Cook. The latter is one of the co-discoverers of the Pullman field located 1½ miles to the north.

The final public auction of oil and gas lease rights to state-owned lands has been scheduled at Lansing, December 2. Approximately 65,000 acres will be offered for sale. Major portions of the acreage listed for the sale is located in 8 northern Michigan counties, but the total offering is scattered in 18 counties. All of the descriptions, with the exception of one 40-acre tract, are classified as wildcat. The one proven description, subject to the sliding-scale override provided by the state, is located in Bentley Dundee oil pool, Gladwin County.

MICHIGAN WILDCAT FAILURES

Allegan County, Lee Township: Ford Oil Co. 1 Sheck, NW NE NE 20-1n-15w, Traverse 1,180 ft., dry, TD 1,185 ft.

Watson Township: Harry Stroud 1 Layton, NE NE SW 1-2n-12w, dry in Coldwater, TD 1,087 ft.

Arenac County, Lincoln Township: Ervin Major 1 Vater, NW NW NW 6-18n-4e, dry in Richfield, TD 4,300 ft.

Bay County, Pinconning Township: Ervin Major 1 Piper 1, NE NE NE 32-17n-4e, Dundee 2,853 ft., dry, TD 3,092 ft.

Kalamazoo County, Comstock Township: George F. Lister 1 Gibbs, NE SW NW 8-2s-10w, Traverse 1,373 ft., dry, TD 1,407 ft.

Mecosta County, Fork Township: J. E. Bauer 1 Williams et ux, NW NW NW 24-16n-7w, Dundee 3,886 ft., dry, TD 3,929 ft.

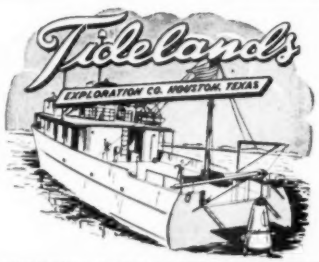
Ottawa County, Holland Township: Socony-Vacuum Oil Co., Inc., 1 Coulas et al., SW SW SW 18-5n-15w, Traverse 1,459 ft., dry, TD 1,499 ft.

MISSISSIPPI

Mystery Surrounds New Adams County Wildcat

JACKSON.—In Adams County, approximately ½ mile south of Natchez, Humble Oil & Refining Co. D-1 Mrs. C. L. S. McKittrick, et al, 50-7n-3w, has created considerable talk and rumors. Operators have released no information on the wildcat. The persistent, although unconfirmed, rumors are that the well encountered 8 ft. of sand with show of oil at 4,430-38 ft. in the upper part of the Wilcox section. This would be approximately equivalent to the 4,600 ft. sand zone in LaGrange field. If this is true, it appears that the Humble well is high. Productive records of all "4,600-ft." sands have been disappointing, so it seems reasonable to assume that Humble's play is based on Lower Tuscaloosa possibilities.

In Hinds County, Mississippi, The Texas Co. 1 C. D. Noble-Mineral fee, 35-5n-4w, is the discovery well for Hinds County's sixth



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piercement-type salt dome. The dome has been designated as Learned Salt Dome.

Humble Oil & Refining Co. is reported to have completed the B-3 McKittrick, 51-6n-2w, ¼-mile extensioner to South LaGrange field, for 248 bbl. of 45 -gravity oil daily. Production is through perforations at 6,360-64 ft. with tubing pressure of 320 psi.

In Wilkinson County, Mississippi, approximately 6 miles north of Centerville, Donald M. Reese is clearing location for an 8,000-ft. test in NE SW 35-3n-1e.

The 1 Mrs. Cora L. Collins, Walthall County wildcat, has been abandoned as a dry hole at total depth of 10,460 ft. by The California Co. with no shows reported in the Tuscaloosa section. Operators have released no detailed information on cores taken, sample tops, or electric log.

MISSISSIPPI WILDCAT FAILURES

Hinds County: The Texas Co. 1 C. D. Noble-Mineral fee, 35-5n-4w, dry, TD 4,452 ft.

Itawamba County: Itawamba Associates, Inc., 1 Kilpatrick Mill Co., 14-10s-9e, dry, TD 1,761 ft.

OHIO, KENTUCKY

Development Producers Pace Week's Operations

COLUMBUS.—Preston Oil Co. 3 Glennis Taylor, Section 3, Bedford Township, Meigs County, in the north end of Hemlock Grove pool, found the Berea sand at 1,780-98 ft. with a fair oil showing, natural. After a 40-qt. shot, the well flowed 55 bbl. and swabbed 5 bbl. for a total of 60 bbl. in the first 24-hour period.

On an outside location, along the south part of Perryton pool, Waverly Oil Co. completed its 1 Frank Phillips, Section 6, Jackson Township, Muskingum County, as a 40-bbl. producer. Clinton sand came in at 3,022-70 ft. and was shot.

In Brush Creek field, National Gas & Oil Co. drilled the 38 U. S. A., Section 4, Blue Rock Township, Muskingum County, from the Clinton to the Medina sand which was logged at 4,289-95 ft. In 24 hours, after a 20-qt. shot, the well flowed 45 bbl.

W. Pfeiffer completed a fair well in the south center part of Lawrence Township, Tuscarawas County, on the Corundite Refractories, Inc., ¾ mile from the nearest production. Clinton sand at 4,741-65 ft. made 260,000 cu. ft. of gas natural, and 829,000 cu. ft. when shut in after shot.

OHIO WILDCAT FAILURES

Ashland County, Clear Creek Township: E. A. Fierbaugh 1 J. F. Glenn, Sec. 21, no Clinton sand, TD 2,480 ft.

Lorain County, Brighton Township: Glenn Harmon et al 1 L. Twining, Lot 11, no Clinton sand, TD 2,301 ft.

WESTERN KENTUCKY

OWENSBORO.—The new Caney Mound pool, 3 miles northeast of Uniontown, in 13-P-20, Union County, is adding another prolific producer in Sinclair Oil & Gas Co. 3 Culver, a northward extension, which made 455 bbl. of clean oil in 8 hours while testing the area's O'Hara pay zone, in which casing was perforated at 2,515-36 ft. Initially, the well flowed an average of 19 bbl. per hour for 5 hours, and then flowed 20 bbl. per hour for 24 hours. Pay zone was acidized with 6,000 gal.

In the new area about 1½ miles further east in 11-P-20, near the Henderson County line, and about 1½ miles northwest of production in the Robinson pool, I. W. Hartman and associates got a second well in their 1 Markham. In Cypress sand at 2,298-2,302 ft., it pumped 126 bbl. of oil in 24 hours.

Kingwood Oil Co. 1 Duncan-Leach, 15-Q-27, which opens another new area about 1½ miles east of the Reed pool in Henderson County, near the Daviess County line, made 77 bbl. of oil and 16 bbl. of water in 11 hours after being placed on the pump. It is 2 miles northwest of Newman.

WESTERN KENTUCKY WILDCAT FAILURES

Daviess County: Morburger & Anton 1 Anderson, NE SW SE 6-P-28, dry, TD 1,198 ft.

Hancock County: J. E. Stephens 1 P. A. Stephens, NE NW NW 4-O-33, dry, TD 1,067 ft.

McLean County: George Ellison et al., 1 Daugherty, SW SW NE 15-M-30, dry, TD 501 ft.

Union County: D. I. McNabb 1 Union County Airport, SE SE NE 13-M-19, dry, TD 2,364 ft.

EASTERN KENTUCKY

ASHLAND.—In Carter County and 10 miles northwest of Grayson, the county seat, Arch Carpenter, on a farmout from California Co., is drilling at 3,567 ft. and looking for top of the St. Peter sand at 1 Virgil Ramey located in 25-X-78. The well is likely to test St. Peter sand plus a portion of the upper Knox dolomite series.

In Indian Creek pool of southern Menifee County a dry hole has recently been drilled by Pieratt & Williams at 3 National Forest Reserve. Corniferous lime topped at 1,025 ft. had only a light show of oil and mostly salt water to a total depth of 1,080 ft.

In Big Sandy gas field of Pike County, Kentucky West Virginia Gas Co. completed its 5895 Thomas P. May for 61,000 cu. ft. of gas daily from Devonian black shale at a total depth of 3,574 ft. In the same field, the company completed the 5914 Nathanial Gilliam for 2,040,000 cu. ft. of gas daily from Maxon (Mississippian) sand at a total depth of 1,566 ft.

EASTERN KENTUCKY WILDCAT FAILURE

Menifee County: Arch Carpenter 1 Mose F. Ferrel, 24-S-71, dry, TD 1,089 ft., brown shale 260 ft., Corniferous 451 ft., Brassfield 670 ft., Trenton 695 ft., no shows.

INDIANA

EVANSVILLE.—Discovery of a new pay zone, the Waltersburg sand, for the Mumford-East Griffin area on the Posey-Gibson County line, 6 miles southeast of Grayville, is indicated by initial tests at C. E. Skiles 2-B Bishop Mumford, NE SE NE 33-3s-13w. Testing saturation found at 1,994-2,010 ft. with 5½-in. oil string run to the top, the well swabbed at the rate of 12 bbl. of clean oil per hour natural. The location is at the south end of the area in Posey County, a half mile south of the Gibson County line.

Four miles south of St. Wendell, and about a mile south of production in the St. Wendell pool, also in Posey County, the same operators have placed their 1 Luigs-Helfert-Schauss, SE SE NW 25-5s-12w, on the pump to open what may prove to be another new area. The well has been in process of completion for sometime with attempts being made to control water, and on the pump still is making about 100 bbl. of water with about 20 bbl. of oil per day. Production is from Cypress sand at 2,280-86 ft.

INDIANA WILDCAT FAILURES

Daviess County: National Associated Petroleum Co. 1 Harder, SW NW SW 11-1n-5w, dry, TD 2,017 ft.

Posey County: A. J. Slagter, Jr., 1 Bauer, NW NE NW 22-8s-14w, dry, TD 2,998 ft.

Vanderburgh County: F. J. Fleming et al., 1 Kracht, SW SW SW 11-5s-10w, dry, TD 2,312 ft.

ILLINOIS

Lawrence County Discovery Flows 1,640 Bbl. First Day

MATTOON.—A new O'Hara lime producing area has been opened in southeastern Lawrence County, 4 miles due south of Lawrenceville, where R. A. Harris and associates 1 Akin, NW NE SW 33-3n-11w, flowed 1,640 bbl. of clean oil in the first 24 hours after starting tests. The location is short distance east of previous productive limits at the extreme southeast end of the Lawrence pool.

Flow the first hour gaged 132 bbl. but dropped slightly to average between 68 and 69 bbl. per hour for the first 24-hour period. In the second 24 hours, it was 1,484 bbl., and for the first 4 days it totalled 6,187 bbl. Swab was run to start the flow but this was lost in the hole where it remained during the above tests.

The O'Hara zone tested is at 1,883-1,901

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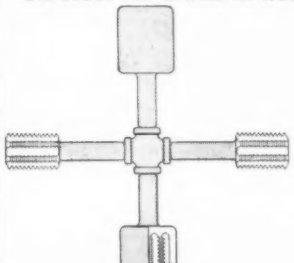

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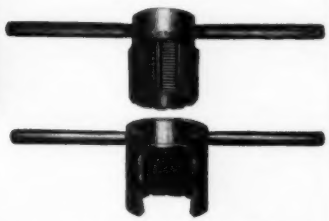

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ft., where the 5½-in. oil string was perforated. Bottom of the hole and casing point is at 1,905 ft.

In the meantime, the same operators have reached the pay in a second well, a northwest diagonal offset, their 1 Oscar Leighty, SE SW NW 32-3n-11w, and have run casing to test. The latter well also found saturation in the Cypress sand, in which a drillstem test at 1,503-28 ft. resulted in a recovery of 5 ft. of clean oil with a good showing of gas. An active development of the area is in sight with locations already made for six additional tests.

ILLINOIS SUCCESSFUL WILDCATS

Christian County: Paul Doran et al., 1 Heater, NW NE NW 15-14n-3w, IP 18 bbl., Devonian 1,812-14 ft., TD 1,853 ft. (Opens new pool).

Edgar County: L. B. Stubbleford 1 Waller, NE SE SE 28-14n-13w, IP 500,000 cu. ft. of gas, Pennsylvanian sand 280-95 ft., TD 460 ft. (New gas area west of Dudley pool).

ILLINOIS WILDCAT FAILURES

Clinton County: W. C. McBride, Inc., 1 Jacobs, NW NE NE 13-3n-3w, dry, TD 2,537 ft.

Coles County: John P. Lewis 1 Norton, SW NW SE 12-14n-10e, dry, TD 405 ft.

Crawford County: F. Lomolino 1 Apple, NW NW NW 27-7n-11w, dry, TD 2,990 ft.

Douglas County: John Lehwald 1 Hudson, NE SE NE 1-14n-9e, dry, TD 472 ft.

Edgar County: Roth & Bartelman 1 Whisnand, SW NW NW 10-13n-14w, dry, TD 352 ft.

Jasper County: J. W. Rudy et al., 1 Beasler, NW SW NE 28-6n-14w, dry, TD 2,753 ft.

Macoupin County: Roy Updike 1 Fensterman, SE NW SW 31-7n-8w, dry, TD 582 ft.

Madison County: Joe Kesl, Jr., 1 Schmidt, NE NE SE 30-6n-6w, dry, TD 590 ft.

A. Wilson 1 Niener, SW NE NW 28-5n-5w, dry, TD 577 ft.

Montgomery County: Reed Dills 1 Latham, SE SE NE 33-9n-4w, dry, TD 661 ft.

Morgan County: J. W. Gerhardt 1 Gerhardt, SW SE NE 31-13n-8w, dry, TD 1,551 ft.

Perry County: Herman Graham 1 Knapp, SE NW NW 6-5s-1w, dry, TD 1,481 ft.

Saline County: Sam Garfield 1 Garner, SW NE NE 34-7s-7e, dry, TD 3,135 ft.

Shelby County: L. Bowles 1 Musser, NE SE NW 16-9n-4e, dry, TD 1,887 ft.

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KANSAS

Ellis County Discovery Swabs 10 Bbl. Per Hour

PEEL DRILLING CO. and I. Hardman 1 Haas, CNL NE NE 2-15-19, prospective new pool opener at the west edge of the Antonino townsite and about 1½ miles southeast of production in the Antonino pool, in Ellis County, swabbed at the rate of 10 bbl. of clean oil per hour in testing Arbuckle lime at 3,697-3,703 ft. The latter swabbing rate followed a 500-gal. acid treatment of the zone. Previously, it swabbed 5½ bbl. per hour for 5 hours.

Aladdin Petroleum Corp. and Crowe Drilling Co. are opening another new pool in their 1 Schartz, SE SE NW 14-19-12, in the area a mile north of the North Hammer pool, Barton County. Testing showings encountered in the Lansing, to which hole was plugged back from the Arbuckle and casing perforated at 3,141-55 ft. and 3,165-71 ft., the well swabbed 60 bbl. of oil in the first 2 hours. Pay was treated fith 1,500 gal. of acid. In testing the Arbuckle at 3,427-53 ft., with open hole from 3,422 ft., the well swabbed only ½ bbl. of oil with 8 bbl. of water per hour, and was not considered commercial. Lansing top was checked at 3,143 ft. (—1,290 ft.).

KANSAS SUCCESSFUL WILDCATS

Coffey County: J. L. Robertson 1 Fisher, SW SE NE 17-23s-14e, pumped 10 bbl. of oil per day from Mississippian at 1,647-89 ft., TD.

Ellis County: E. H. Adair 1 Froelich, SW SE SE 27-12s-16w, pumped 203 bbl. of 39°-gravity oil per day from Arbuckle at 3,541-44 ft.; anhydrite 1,195 ft., Hoxbar 3,231 ft., Dodge 3,236 ft., Lansing 3,283 ft., TD 3,544 ft.

KANSAS WILDCAT FAILURES

Barton County: Fred Anschutz 1 Bittet, SW SW NE 19-16s-14w, dry, TD 3,452 ft.; anhydrite 900 ft., Lansing 3,150 ft., conglomerate 3,388 ft., Arbuckle 3,407 ft.

E. G. Bradley et al 1 Massman, SW SW SE 10-19s-13w, dry, TD 3,468 ft., anhydrite 765 ft., Hoxbar 3,073 ft., Lansing 3,186 ft., conglomerate 3,419 ft., eroded Arbuckle 3,429 ft., Arbuckle 3,438 ft.

Butler County: John Lindas and Table Mesa 1 Gamble, SW NW NW 23-26s-4e, dry, TD 2,743 ft., Lansing 1,905 ft., Kansas City 2,095 ft., Viola 2,640 ft., Simpson 2,652 ft., Arbuckle 2,730 ft.

Greenwood County: Reed 1 Reed, NW SW SE 28-25s-12e, dry, TD 1,573 ft., Kansas City 980 ft., Bartlesville 1,545 ft.

McPherson County: Anderson-Prichard and W. G. Talbott 1 Blaine, SW SE NW 28-17s-1w, dry, TD 3,291 ft., Lansing 2,070 ft., Mississippian 2,644 ft., Kinderhook 2,818 ft., Hunton 2,926 ft., Maquoketa 3,020 ft., Viola 3,112 ft., Simpson shale 3,215 ft., Simpson dolomite 3,221 ft.

Morris County: Lance Hill et al 1 Doran, SE SE NE 24-15s-8e, dry, TD 3,420 ft., Lansing 1,655 ft., Kansas City 1,780 ft., basal Kansas City 2,015 ft., basal Oswego 2,200 ft., Checkerboard 2,260 ft., Mississippian 2,571 ft., Kinderhook 2,807 ft., Hunton 2,934 ft., Viola 3,196 ft., Simpson sandy dolomite 3,286 ft., St. Peter 3,302 ft., Arbuckle 3,368 ft.

Osborne County: Shoshone Oil Co. (El Captian Oil Co.) 1 Heiser est., SW SW SW 12-8s-14w, dry, TD 3,200 ft., Topeka 2,860 ft., Lansing 3,083 ft.

Reno County: Homer Snowden 1 Swansen, NE NE NW 26-23s-5w, dry, TD 4,000 ft., anhydrite 678 ft., Kansas City 2,670

ft., Mississippian 3,377 ft., Kinderhook 3,710 ft., Hunton 3,741 ft., Viola 3,858 ft., Simpson 3,874 ft., Arbuckle 3,969 ft.

Russell County: M. B. Armer 1 Smith, SE SE SE 17-14s-15w, dry, TD 3,347 ft., anhydrite 890 ft., Topeka 2,747 ft., Hoxbar 3,010 ft., Kansas City 3,057 ft., conglomerate 3,311 ft., Arbuckle 3,329 ft.

PERMIAN BASIN

Gaines County Wildcat Seeks Deep Production

MIDLAND.—Forest Oil Corp. and Anderson-Prichard Oil Corp. 1-A Parmer, Gaines County wildcat some 18 miles southeast of Seminole, was attracting attention as a possible deep discovery. According to early reports it was thought to be in the Mississippian, or possibly the Pennsylvanian. A 4-hour drill-stem test from 12,045-12,156 ft. recovered 4,500 ft. of water blanket cut with oil, 565 ft. of mud-cut oil, and 4,070 ft. of clean 40.8°-gravity oil.

It drilled ahead to 12,200 ft., and a test attempted at 12,044-12,200 ft., but started kicking when the tool had been lowered to 5,500 ft. After weighting the hole with mud, the test was apparently made. However, following the test, drill pipe was pulled up to 5,500 ft. where high pressure prevented any further backing off. Operators were to knock the plug from bottom of the drill stem and force 10 lb. mud into the hole in an attempt to restore circulation. On the test it showed flowing pressure ranging from 1,500-2,225 psi. and shut-in pressure of 5,075 psi. in 15 minutes. Electrical survey was to be run after restoring circulation.

Location of the 1-A Parmer is 860 ft. from west and 660 ft. from south lines, Labor 12, League 317, Parmer County School Land Survey, which places it about 12 miles west of nearest deep production in Flanagan field.

Additional Gaines County exploration tests reported included: Amerada Petroleum Corp. 1 Breckon, 25-A9-PSL, 5 miles east of Hobbs, digging cellar and pits; Atlantic Refining Co. 1-H Riley, 125-G-WTRR, Yates test 2¼ miles west of Homann field, had location staked; Los Nietos Oil Co. 2-B Doss, 360-G-CCSD&RGNG, 9 miles southwest of Seminole, drilling at 10,756 ft.; Mid-Continent 1 Nichols, 7-A10-PSL, 5 miles east of Hobbs field, drilling at 7,125 ft. after recovering drilling mud on drill-stem tests at 6,446-6,660 ft. and 6,660-6,757 ft.; Shell Oil Co. 1 Andrews, 2-A-23-PSL, pumped 107 bbl. of fluid in 16 hours, being 70 per cent water, and plugged back to 7,229 ft. from 12,580 ft.

Borden County.—Bay Petroleum Corp. and others made location for 1-A L. A. Pearce, NW NW 35-31-T5N-T&P, 1 mile west of the town of Gail, for an 8,200-ft. exploration. Elevation was estimated at 2,550 ft.

Honolulu Oil Corp. 1 T. J. Good, SE NW 2-32-T3N1T&P, is a new well, scheduled to 8,500 ft. Location is 4 miles northeast of Vealmoor field, 5½ miles east of Good field, and ¾ mile due south of Seaboard 1 Jerry Clayton, an 8,200-ft. failure.

Runnels County.—Rambo & Stephens and T. W. Murray 1 William Stephens, Section 81, TCRR Survey, 6 miles northwest of Winters and nearly 2 miles north of Winters field, flowed oil on a drill-stem test at 4,500-20 ft., identified as Strawn. Gas showed in 2 minutes and flowing oil in 7 minutes. Recovery was 2,940 ft. of 45°-gravity oil with no water. Flowing pressure was 1,800 psi. Operators ran electrical survey and prepared to complete. The North Winters field produces from the Gunsight, Swastika, and Bunger lime.

Scurry County.—New outposts in the reef limestone areas announced this week included: Lone Star Producing Co. 1 Lyle Deffebach, Lot 18, Section 40, Kirkland & Fields Survey, a 7,000-ft. test ¾ mile south of North Snyder production; R. C. Lipscomb 1 N. C. Von Roeder, 467 ft. from north and west lines, east half, 75-25-H&TC, an 8,000-ft. exploration, 2 miles south of Sharon Ridge Canyon production; Spartan Drilling Co. 1 J. H. Langford, 8,200-ft. Ellenburger wildcat 3½ miles northwest of Diamond M field, 467 ft. from north and 660 ft. from east lines, southeast quarter, 240-97-H&TC.

S. B. Roberts 1 B. H. Lewis, 246-97-H&TC, northwest outpost to Kelley field, completed this week for a flowing potential of 610.5 bbl. of 42°-gravity oil a day with no water, flowing through ½-in. choke. Production was from open hole from 6,840-68 ft., total depth. The well was acidized with 4,000 gal.

Cities Service Oil Co. 1-H Johnson, SE NE 200-97-H&TC, ¾-mile north extension to Diamond M field, completed flowing 642 bbl. of 42°-gravity oil a day, through ¾-in. choke from open hole at 6,686-6,808 ft. Top of reef was 6,670 ft., or minus 4,242 ft.

Cities Service 1 N. C. Roeder, 16-1-J. P. Smith Survey, south offset to Standard-Fryer 1 Wilkirson, between North Snyder and Kelly fields, flowed 36 bbl. of oil in 1 hour through ¾-in. choke. Production apparently was between casing at 6,630 ft. and 6,735 ft., total depth. Two miles southeast of the 1 Wilkirson, Standard-Fryer 1 York, 180-3-H&GN, was below 6,706 ft., still in shale, and believed to be about 165 ft. above water level.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Gaines County: The Texas Co. 1 E. D. Harris, NE NE 17-A22-PSL, about 4 mi. E. 1 mi. S Flanagan field, 3 mi. S Texas 1 Wharton, Glorietta discovery; TD 7,520 ft., elevation 3,255 ft., Glorietta pay 5,965 ft., perforated 4 jet shots 5,965-80 ft., IP pumped 51.5 bbl. 31°-gravity oil a day.

Sutton County: Shell Oil Co. 1 S. B. Roberts, 7-7-TW&NG, SE corner of county, 35 mi. SE Sonora, TD 4,653 ft., PB 3,475 ft., elevation 2,226 ft., Pennsylvanian 3,250 ft., Ellenburger 4,340 ft., top Strawn pay 3,406 ft., IP flowed 148,000 cu. ft. gas a day, 16/64-in. choke, CP 400 psi., TP 110 psi.

Upton County: Republic Natural Gas Co. 1 V. J. Powell, NW NW 44-40-T4S-T&P, 2¼-mi. SE extension to Pegasus field, TD 13,125 ft., elevation 2,869 ft., 7-in. casing set to 12,945 ft., top of Ellenburger pay, IP flowed 638.7 bbl. 53°-gravity oil a day, ¾-in. choke, GOR 1,830 cu. ft., TP 150 psi., total acid 25,000 gal.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Coke County: Saxon Exploration Co. 1 Ward Hill, Wilhelm Thuren Sur. 389, 6 mi. SE Bronte field, dry, TD 5,408 ft., elevation 1,754 ft., Ellenburger 5,234 ft.

Mitchell County: Shamrock Oil & Gas Corp. et al 1 W. R. Powell, 81-27-T&P, 7½ mi. SW Colorado City, dry, TD 3,445 ft., elevation 2,095 ft., San Andres 1,300 ft., San Angelo 1,940 ft., Clear Fork 2,160 ft.

Pecos County: Ramon Development Co. 1 University, 30-16-University Lands, 2 mi. N Bakersfield, dry, TD 1,685 ft., elevation 2,474 ft., San Andres 1,658 ft.

Schleicher County: Honolulu Oil Corp. 1 Willie Tisdale, 74-11-GC&SF, 9 mi. N Eldorado, dry, TD 6,969 ft., PB 5,820 ft., elevation 2,320 ft., reef lime 5,795 ft., Ellenburger 6,660 ft.

Morgan-Aikman 1 Will Lovelace, SW SW 4-M,GH&SA, 3 mi. NW Page field, dry, TD 6,000 ft., PB 5,733 ft., elevation 2,395 ft., Strawn 5,650 ft., swabbed and flowed 2 bbl. oil an hour, then flowed 12 bbl. oil a day by heads from perforations at 5,700-18 ft., last gage swabbed 4 bbl. oil a day plus 50 bbl. water.

Scurry County: Olson Drilling Co. and others 1 Jess B. Green, NW NW 157-3-H&GN, 2 mi. E Standard-Fryer 1 Wilkirson, dry, TD 8,177 ft., elevation 2,447 ft., reef 6,927 ft., Ellenburger 7,920 ft.

Ray Harris Drilling Co. 1 Laura B. Smith, NW NW 159-97-H&TC, 2 mi. E Sharon

(Continued on page 197)

CANADIAN FIELDS

New Production Tapped North of Stettler Field

CALGARY.—British Empire Oil Developments, Ltd., Calgary independent, discovered oil in the D2 zone of Devonian at its wildcat about 3 miles north of Stettler field discovered by Canadian Gulf Oil Co. Indications are that the important well is a discovery of a new pool rather than a major extension to Gulf's dual Devonian field to the south.

The well, British Empire-Stettler 1, LSD 4, 27-38-20w4, is located about 95 miles northeast of Calgary. The discovery has reached base of the oil pay in D2 Devonian zone, with a minimum of 28 ft. of productivity established, and is now drilling on in search of the second major objective, D3 zone, currently at 5,325 ft.

Oil-bearing porosity in D2 zone was topped about 5,202 ft. First drill-stem test of interval 5,201-12 ft., gave a maximum gas flow rate of 50,000 cu. ft. daily plus a pipe recovery in 1 hour of 3,870 ft. of clean crude oil. Second test, of interval 5,204-19 ft., gave a maximum gas flow rate of 500,000 cu. ft. daily with flow of oil reaching the surface in 26 minutes.

Third drill-stem test, of interval 5,219-28 ft., gave a maximum natural gas flow rate of 250,000 cu. ft. daily plus a pipe recovery in 1 hour of 3,600 ft. of clean oil. The fourth test, of interval 5,228-43 ft., had a small gas flow, with pipe recovery consisting of some oil plus 3,600 ft. of sulfur water.

Royalite Oil Co. of Calgary plans to commence drilling early in December on Graham Island, British Columbia. A rotary drilling rig owned by Royalite has been transported by rail from Central Alberta to Prince Rupert, B. C., and is now being hauled by boat to the location. Substructure is in place and about half of the drilling equipment is already on site.

A natural gas strike, small in volume but important in its opening of oil and gas possibilities along the Pacific Coast, was made at Lulu Island, 10 miles south of the city of Vancouver. The discovery shows an estimated gas flow of 500,000 cu. ft. daily from a sand at the 800-ft. level, according to the backing company, Richmont Gas & Oil Co. It is planned to deepen the well in search of oil and additional gas. The present strike, while small under Alberta standards, is the most promising to date at Lulu.

Seventeen wells were completed in Alberta during the past week, 13 as successful field development wells plus 4 dry holes, of which 3 were wildcats. At Redwater, Imperial Oil, Ltd., placed 4 more wells on production to raise its total producers in that field to 72. Canadian Gulf Oil Co. added 2 more oil wells and 1 failure, to give it a total of 29 producers. Gulf plans, at a later date, to rework the one unsuccessful well that was temporarily abandoned this week. The Texaco Exploration Co.-McColl-Frontenac Oil Co. team completed 2 more producers, giving it 15 wells at Redwater.

The Home Oil Co.-Anglo Canadian Oil Co.-Calgary & Edmonton Corp. team successfully completed its tenth Woodbend well. Imperial placed one Leduc and one Woodbend well on production, and the Texaco-McColl team obtained its first producer at Leduc, in the southwest extension area of the field.

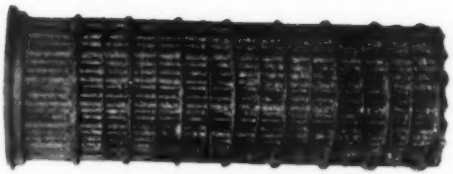
General Petroleums - Superior-Kroy-Jupiter team placed its fourth successful well on production in the Viking sand Joseph Lake field, an Imperial Oil farmout project.

CANADIAN UNSUCCESSFUL WILDCATS

Calmont Calnorth 5, LSD 1, 33-51-25w4, dry, TD 4,748 ft.

Petromine Ribstone 1, LSD 8, 31-43-2w4, dry, TD 3,805 ft.

Coastal Whitemud 1, LSD 2, 23-51-25w4, dry, TD 4,151 ft.



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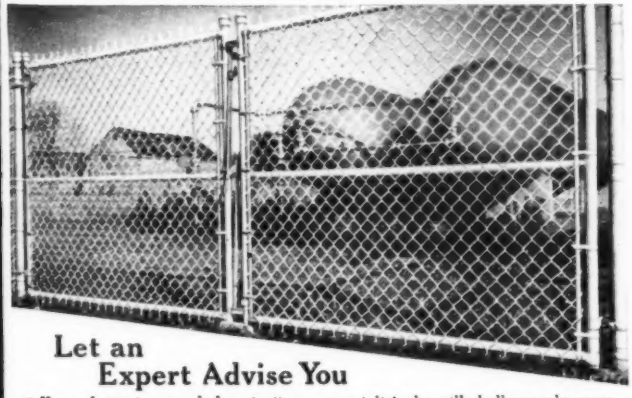

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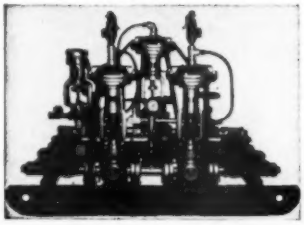

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Operators May Exceed Completions Forecast Made at Midyear

by Polly DeArmond

A PRELIMINARY recapitulation of 10-month figures shows that wells completed so far during this year are only 2.8 per cent below those for January through October of record-breaking 1948, while footage drilled for the period in 1949 edged .3 per cent over that of the previous year.

The cumulative summary also indicates that operators will not only fulfill their program of 37,103 wells and 138,097,000 ft. for the entire year *(see The Oil and Gas Journal, July 28, 1949)*, but even might exceed those forecasts.

Cumulative Comparisons

Total completions for 1949 at the end of October reached 31,782, with 112,871,041 ft., against 32,713 wells and 112,500,884 ft. for those months of 1948. The eastern area of New York, Pennsylvania, and West Virginia continued its decline, dropping 39.8 per cent in wells and 40.7 per cent in footage. The western United States showed the next largest decreases: the Rocky Mountain region falling 10.4 per cent in completions and 12 per cent in footage; California dipping 10.8 per cent in wells but reflecting deeper drilling for the period by increasing 1.2 per cent in footage.

The Southern states (Arkansas, Louisiana, Mississippi, Tennessee, Alabama, Georgia, and Florida) also reported deeper wells, offsetting a decline of 3.3 per cent in completions with an increase of 4.7 per cent in footage, compared with operations for the same period last year.

The north central section, including Ohio, Indiana, Illinois, Kentucky, and Michigan, noted a 5.8-per cent gain in wells, but fell off 1.5 per cent in footage in 10-month comparison.

Gains in both categories were recorded in two areas, Texas-New Mexico was up 9.1 per cent in completions and 7.6 per cent in footage drilled. Oklahoma - Kansas - Nebraska maintained slight margins (.5 per cent in wells and .2 per cent in footage) over last year's figures.

Projected Totals

During postwar years, 10-month completions have averaged 82.6 per cent of the year's total. Using this ratio, plus the comparatively steady and fairly high "rigs and drilling" figure, total completions for the current year might reach 38,474. Also in past years, footage has averaged 81.8 per cent of the total depth for the entire 12 months. If such a proportion continues to hold good, 137,984,157 ft. could be drilled in 1949, topping 1948's record by 112,800 ft.

SUMMARY OF COMPLETIONS, OCTOBER 1949

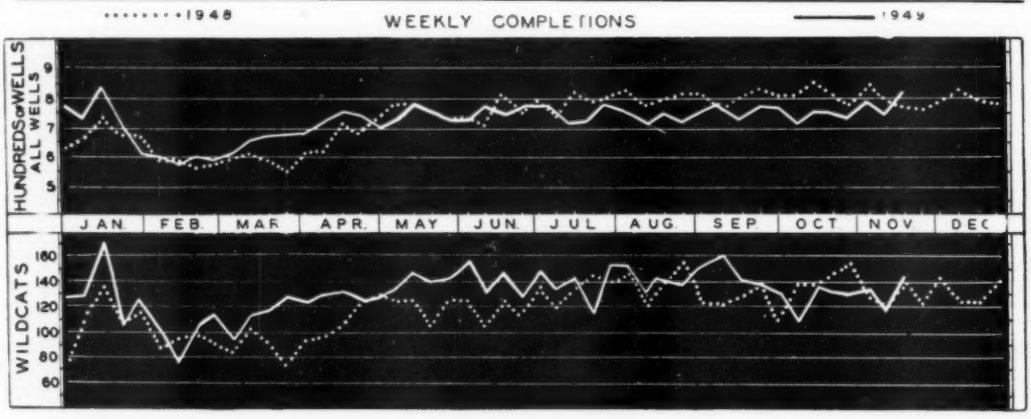
	Total comp.	Oil	Gas	Dry	Under 2,500-ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Rigs and drilling
New York	60	31	0	29	60	0	0	0	0	0	71,423	61
Pennsylvania	155	78	20	57	148	7	0	0	0	0	134,057	239
West Virginia	34	6	22	6	19	14	1	0	0	0	90,858	159
Ohio	105	30	36	39	66	38	1	0	0	0	209,067	143
Indiana	151	65	6	80	126	25	0	0	0	0	241,023	126
Kentucky	111	51	19	41	85	26	0	0	0	0	201,112	78
Illinois	292	146	1	145	171	121	0	0	0	0	605,535	238
Michigan	114	54	3	57	76	38	0	0	0	0	246,504	150
Kansas	283	128	54	101	52	227	4	0	0	0	859,672	411
Neb., Mo., Iowa	4	2	0	2	0	4	0	0	0	0	17,645	8
Oklahoma	355	206	9	140	140	154	48	6	7	0	1,097,970	681
Texas	1,010	659	49	302	246	443	234	68	15	4	4,238,259	1,471
North	210	128	2	80	107	83	20	0	0	0	593,526	171
West Central	122	65	0	57	49	62	11	0	0	0	370,767	213
West	266	223	2	41	50	105	82	18	9	2	1,266,218	498
Panhandle	69	40	24	5	3	66	0	0	0	0	209,508	130
East	77	59	2	16	1	55	10	10	0	1	371,759	112
Gulf Coast	149	82	13	54	11	37	64	32	5	0	878,125	181
Southwest	117	62	6	49	25	35	47	8	1	1	548,356	166
Louisiana	191	120	18	53	84	30	21	23	24	9	974,048	262
Northern	121	69	16	36	81	21	15	3	1	0	346,181	104
Southern	70	51	2	17	3	9	6	20	23	9	627,867	158
Arkansas	30	17	1	12	7	19	3	1	0	0	109,255	41
Mississippi	25	11	0	14	0	4	10	8	3	0	181,976	34
Ala., Ga., Fla.	6	1	0	5	0	4	0	1	1	0	34,584	7
Tennessee	9	1	0	8	9	0	0	0	0	0	3,512	8
Montana	17	10	2	5	12	4	1	0	0	0	42,678	65
Wyoming	45	23	0	22	3	14	18	8	1	1	244,022	126
Colorado	6	0	1	5	2	3	1	0	0	0	19,809	21
Utah	7	3	0	4	1	3	1	1	1	0	38,012	17
New Mexico	44	28	6	10	8	25	6	3	1	1	189,385	122
California	216	152	9	55	76	78	36	15	9	2	888,451	141
Dakotas	8	0	3	5	6	2	0	0	0	0	13,988	5
Total October 1949	3,278	†1,822	259	*1,197	1,397	1,283	385	134	62	17	10,752,845	14,614
Total September 1949	3,511	1,967	299	1,245	1,396	1,385	468	160	82	12	12,587,261	4,543
Total October 1948	3,706	2,024	280	1,402	1,532	1,528	382	186	78		12,593,030	5,105
Cumulative 1949	31,782	17,825	2,353	11,604	12,213	12,941	4,080	1,658	773	117	112,871,041	
Cumulative 1948	32,713	18,585	2,402	11,726	12,970	13,413	3,783	1,773	774		112,500,884	

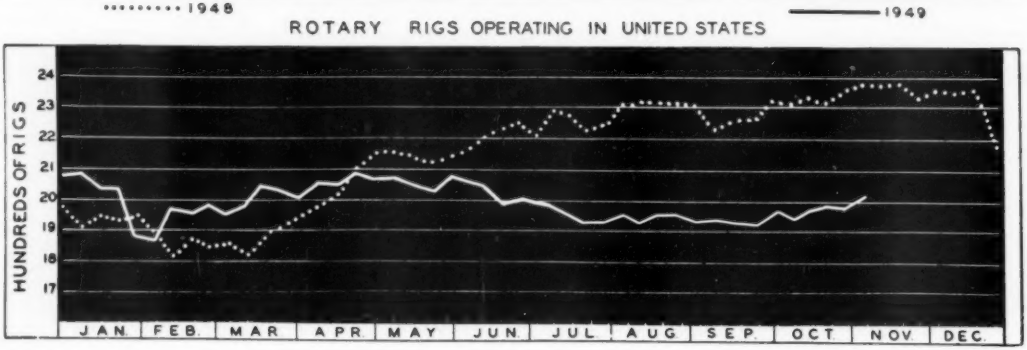
*Incl. 118 service wells: N. Y. 29, Pa. 54, Ohio 4, Mich. 15, Kans. 5, Okla. 8, No. Tex. 1, West. Cent. Tex. 1, No. La. 1. †Incl. 26 distillate wells: Okla. 5, W. Tex. 3, E. Tex. 1, Tex. Gulf 3, No. La. 3, So. La. 9, Miss. 2. ‡Incl. all wells rigged up and/or drilling at end of month.

WEEKLY WELL COMPLETIONS . . WEEK ENDED NOVEMBER 19, 1949

	Total of all wells					Nov. 19		Wildcat completions and discoveries					Cumulative total, 1949				
	Comp.	Oil	Gas	Dry	Footage	1949	1948	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	9	4	0	*5	9,939	669	1,202	0	0	0	0	0	0	0	0	0	0
Pennsylvania	23	7	5	†11	41,271	1,687	2,624	0	0	0	0	0	0	0	4	1	5
West Virginia	12	0	9	3	34,259	456	756	0	0	1	0	1	1	0	12	11	24
Ohio	31	10	7	‡14	62,041	962	1,195	0	0	0	2	2	2	0	2	29	33
Indiana	21	10	0	11	41,273	1,156	940	0	0	0	3	3	31	0	3	209	243
Kentucky	27	9	0	18	38,385	902	800	0	0	0	5	5	25	0	0	70	95
Illinois	73	37	1	‡35	130,276	2,405	2,038	1	0	1	14	16	61	0	2	421	484
Michigan	21	11	1	9	55,118	905	740	0	0	0	7	7	26	0	3	275	304
Kansas	65	25	11	29	206,013	2,886	2,774	2	0	0	9	11	68	0	9	359	436
Neb., Mo., Iowa	1	1	0	0	4,218	29	55	0	0	0	0	0	2	0	0	17	19
Oklahoma	93	50	2	‡41	363,074	3,794	3,666	5	0	1	16	22	129	13	16	543	701
Texas	282	180	15	87	1,124,268	11,584	10,534	8	0	4	36	48	355	40	107	1,988	2,490
North Central (Dist. 7-B & 9)	96	53	1	42	266,965	3,880	3,270	2	0	1	11	14	158	0	19	792	969
West (Dist. 7-C & 8)	63	45	1	‡17	317,796	2,827	2,821	2	0	1	10	13	56	1	6	237	300
Panhandle (Dist. 10)	27	20	7	0	83,639	848	581	0	0	0	0	0	1	0	1	9	11
Eastern (Dist. 5, 6, & 6-P)	20	12	0	8	87,800	689	523	0	0	0	5	5	11	4	3	139	157
Gulf Coast (Dist. 2 & 3)	41	29	3	9	204,852	1,698	1,663	1	0	1	3	5	71	28	44	330	473
Southwest (Dist. 1 & 4)	35	21	3	11	163,216	1,642	1,676	3	0	1	7	11	58	7	34	481	580
Louisiana	50	27	4	19	261,741	2,011	2,052	0	0	0	8	8	50	18	4	181	253
Northern	30	17	4	9	98,885	1,204	1,383	0	0	0	4	4	5	2	0	85	92
Southern	20	10	0	10	162,856	807	669	0	0	0	4	4	45	16	4	96	161
Arkansas	10	5	0	5	36,279	283	259	0	0	0	3	3	3	0	1	62	66
Mississippi	10	5	0	5	62,629	302	367	0	0	0	2	2	5	2	1	93	101
Southeastern States	0	0	0	0	0	42	42	0	0	0	0	0	1	0	0	34	35
Montana	25	13	2	10	57,382	262	280	0	0	0	4	4	4	0	2	31	37
Wyoming	18	11	1	6	86,706	527	491	0	0	1	5	6	22	0	1	103	126
Colorado-Utah	0	0	0	0	0	123	197	0	0	0	0	0	2	0	0	61	63
New Mexico	6	4	1	1	19,099	444	530	1	0	0	1	2	13	1	2	47	63
California	47	42	0	5	177,458	2,312	2,499	1	0	0	3	4	35	0	7	404	446
Dakotas	0	0	0	0	0	16	2	0	0	0	0	0	0	0	0	13	13
Total United States	824	451	59	314	2,811,429	33,759	34,103	18	0	8	118	144	835	74	176	4,952	6,037
Total previous week	748	411	61	276	2,701,997			12	0	2	103	117	817	74	168	4,834	5,893
Total November 20, 1948	774	446	42	286	2,534,968			22	4	2	112	140	781	67	218	4,498	5,564

Service wells included: *5, †8, ‡1.





DAILY AVERAGE PRODUCTION FOR WEEK

	Nov. 19 crude oil	B. of M. Nov. demand	Nov. 12 crude oil
Alabama	1,350	1,200	1,350
Arkansas	73,750	85,000	72,800
California	869,000	850,000	866,100
Colorado	64,800	73,000	63,200
Eastern	58,500	60,900	61,800
Florida	1,075	1,000	1,075
Illinois	178,700	185,000	180,900
Indiana	28,600	29,000	27,600
Kansas	295,300	302,000	274,950
Kentucky	25,100	23,000	24,600
Louisiana	529,750	530,000	531,500
North Louisiana	118,350		120,100
South Louisiana	411,400		411,400
Michigan	43,300	45,000	41,900
Mississippi	96,500	108,000	93,900
Montana	26,000	25,000	25,900
Nebraska	1,200	700	1,250
New Mexico	132,900	138,000	132,900
Oklahoma	428,600	415,000	425,900
Texas	2,169,425	2,230,000	2,169,425
Dist. 1 (Southwest)	27,300		27,300
Dist. 2 (Southwest)	132,425		132,425
Dist. 4 (Southwest)	204,200		204,200
Dist. 3 (Gulf Coast)	400,925		400,925
Dist. 5 (Eastern)	37,575		37,575
Dist. 6 (Eastern)	92,950		92,950
East Texas field	273,300		273,300
Dist. 7-C (West)	55,325		55,325
Dist. 8 (West)	645,975		645,975
Dist. 7-B (W. Central)	63,150		63,150
Dist. 9 (N. Central)	144,000		144,000
Dist. 10 (Panhandle)	92,300		92,300
Utah	3,350	1,200	3,350
Wyoming	134,500	127,000	135,100
Total United States	*5,161,700	5,230,000	5,135,500
Change from previous week, up	26,200		
Canada	60,435		63,160

Total U. S. production January 1-November 19 †1,638,670,170 bbl.
Same period last year (crude plus cond.) 1,784,543,670 bbl.

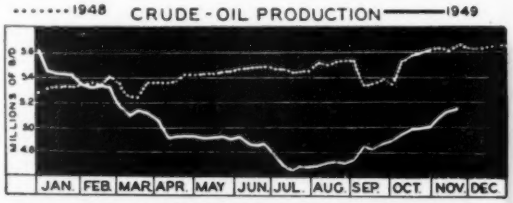
*Not including 82,280 bbl. condensate. †Including 26,545,460 bbl. condensate.

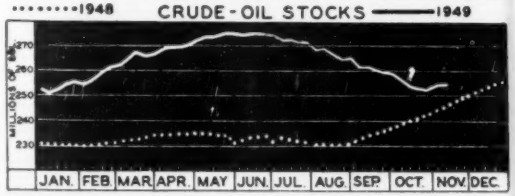
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

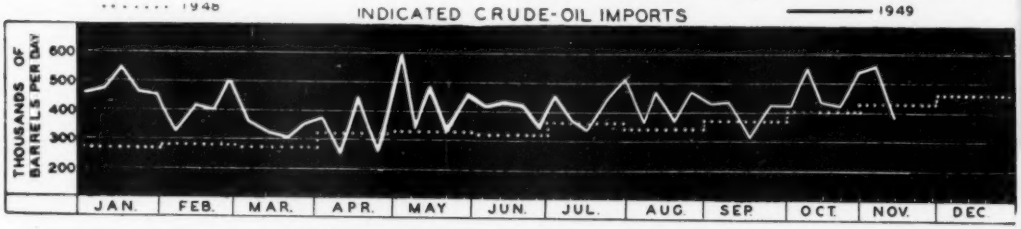
(Thousands of barrels)

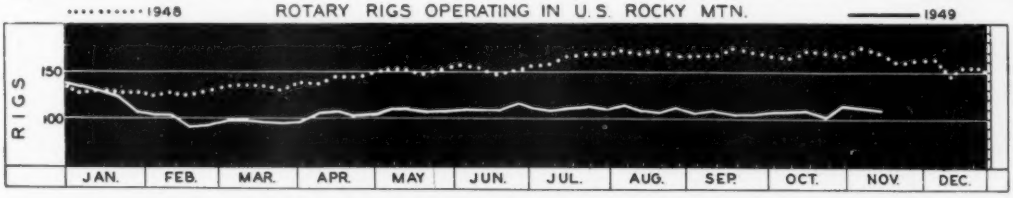
	Nov. 12, 1949	Nov. 5, 1949	Nov. 13, 1948
Pennsylvania Grade	3,147	3,188	2,979
Other Appalachian	1,952	1,840	1,464
Illinois, Indiana, Michigan	11,793	11,395	11,241
Arkansas	2,575	2,574	3,368
Louisiana	13,453	13,062	12,591
North	3,471	3,150	2,831
Gulf	9,982	9,912	9,760
Mississippi	2,468	2,518	2,638
New Mexico	7,444	7,443	5,724
Oklahoma and Kansas	36,491	36,738	36,754
Texas	115,640	115,567	114,455
East Texas	16,249	16,463	15,372
West Texas	44,380	44,357	44,408
Texas Gulf	29,936	28,887	29,029
Other Texas	25,073	25,860	25,646
Rocky Mountain	13,902	14,111	11,050
California	37,836	37,646	35,449
Foreign	7,610	8,039	5,282
Total United States	254,311	254,121	242,995

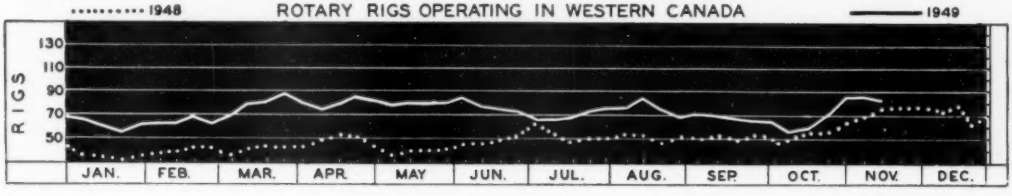
*Bureau of Mines.









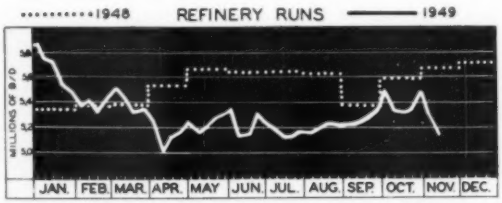


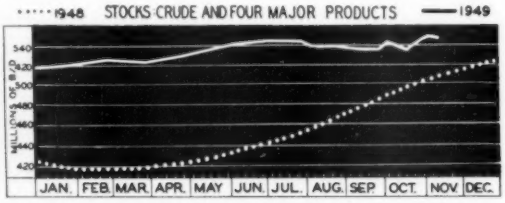
A.P.I. REFINERY REPORT, NOVEMBER 12

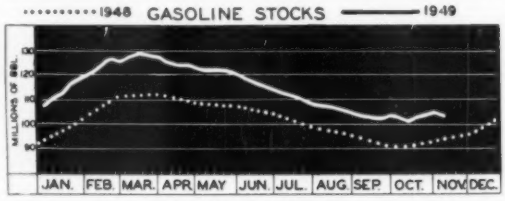
(Thousands of barrels)

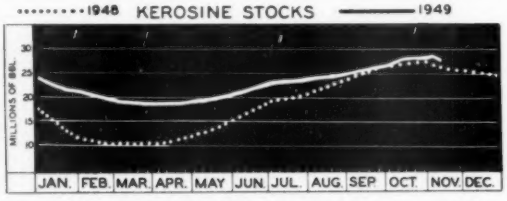
District	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, November 1948				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	736	286.1	23.4	175.0	191.6	22,623	12,115	30,392	10,504	865	303.8	43.6	177.5	220.7
Appalachian:														
District 1	90	46.4	5.7	10.9	10.9	2,636	442	966	513	101	43.3	7.6	12.5	13.5
District 2	52	23.4	3.0	7.4	10.9	1,318	138	253	212	71	35.5	3.4	10.4	15.9
Ind., Ill., Ky.	941	500.6	58.9	146.6	148.9	21,649	5,449	14,259	4,505	967	486.9	67.2	141.7	151.7
Okla., Kans., Mo.	418	236.3	18.1	75.4	63.1	9,306	1,598	6,367	1,791	437	241.2	22.0	84.1	75.2
Inland Texas	212	157.1	10.0	24.6	45.3	3,889	853	1,051	1,519	240	157.6	16.5	22.4	59.1
Texas Gulf Coast	1,160	579.9	96.9	226.4	223.1	14,762	3,532	15,596	7,938	1,387	622.6	117.4	338.5	244.1
La. Gulf Coast	444	225.9	57.4	109.3	54.3	5,831	1,889	5,481	2,741	451	190.0	58.2	99.5	74.7
N. La. and Ark.	76	30.7	7.4	13.0	15.0	2,296	379	762	321	85	32.5	8.8	12.7	19.0
Rocky Mountain:														
New Mexico	11	6.4		1.4	2.7	80	50	94	31	13	6.4	0.3	1.8	3.9
Other Rocky Mtn.	151	70.9	4.0	25.8	35.1	2,460	362	2,060	580	151	69.6	3.6	28.9	38.1
California	836	362.9	12.0	162.6	315.4	16,727	815	14,836	37,872	961	361.9	13.0	140.8	375.6
November 12, 1949	5,127	2,526.6	298.8	978.4	1,116.3	103,577	27,622	92,117	68,527	5,729	2,551.3	361.6	1,070.8	1,291.5
November 5, 1949	5,314	2,637.1	302.0	1,028.0	1,104.0	104,257	28,399	92,038	69,192					
November 13, 1948	5,769	2,544.4	380.7	1,085.0	1,295.6	91,795	26,413	79,351	62,415					

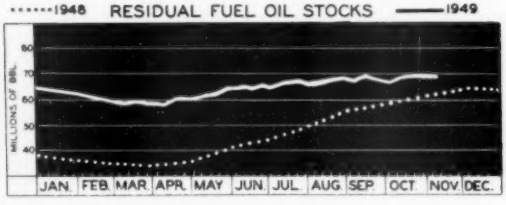
*At refineries including natural blended. †Finished and unfinished.

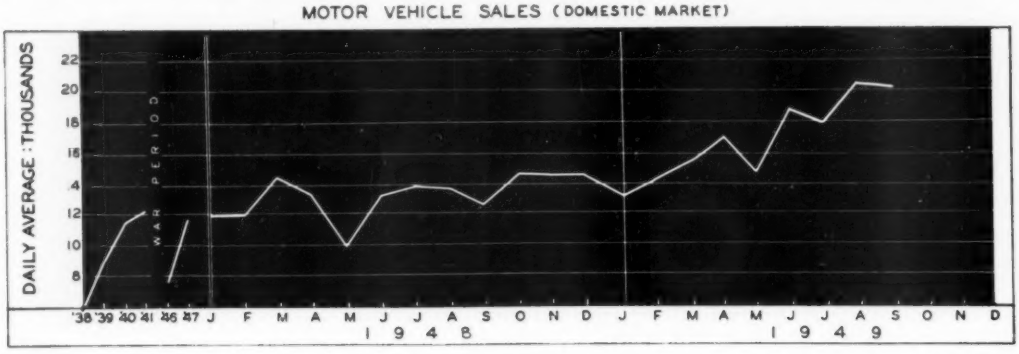











MOTOR VEHICLE SALES (DOMESTIC MARKET)
DAILY AVERAGE: THOUSANDS
WAR PERIOD
'38 '39 '40 '41 '45 '47 J F M A M J J A S O N D J F M A M J J A S O N D
1948
1949

CRUDE PRICES
GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.53	....	....	....
19-19.9	1.63	....	....	....
20-20.9	1.73	$2.25	....	$2.13
21-21.9	1.82	2.27	....	2.14
22-22.9	1.92	2.29	....	2.16
23-23.9	2.02	2.31	....	2.18
24-24.9	2.12	2.33	$2.56	2.20
25-25.9	2.22	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.40
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

MID-CONTINENT refiners reported better movement of distillate fuel oil for the past few days despite the relatively mild weather in the northern market area. However, distillate stocks in the Oklahoma-Kansas district have not been much above last year's level, 6,367,000 bbl. on November 12 compared with 6,319,000 bbl. at the end of last November.

Distillate deliveries in the high-demand areas of the East Coast continue to lag behind last year with most storage filled and resellers waiting for cold weather.

Following the experience with mild weather last winter, refiners are expected to do more this season toward adjusting runs to a level that will meet distillate demands without unwieldly inventories at the end of the season. If the weather is unusually cold in the mid-winter months, excess refining capacity is available to produce distillate fuels to meet the increased demand. A higher distillate price is the only incentive needed for a jump in distillate production.

Gasoline markets are showing only the normal seasonal weakness, but there has been little reduction in gasoline yields. In the 5-week period ended November 12, refinery demand for gasoline was 4.4 per cent greater than in the same period last year compared with an increase in gasoline production amounting to 4.9 per cent. Gasoline stocks dropped 680,000 bbl. for the week of November 12, but this was due to decreased refinery activity and a drop of 774,000 bbl. in gasoline production for the week. The fact that runs were cut 3.5 per cent while gasoline production was down 4.2 per cent may be one of the first indicators of the expected shift in yields.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of November 21, 1949. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 74-76 octane	9½-10	10.625-11.5	9½-10
Premium gasoline, 78-80 octane	10⅜-11	12.5	10⅞-11
42-44 w.w. kerosine	7¾-8¼	8.3-8.9	7½-8
No. 2 straw fuel oil	6¾-7	7.75-8.5	7-7¼
No. 6 residual	$0.90-1.00	$1.90-2.05	$1.60-1.75

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5⅞	5⅜	5⅝
Grade 18-55	7.1	6.5	6.8

LUBRICATING OILS
SOUTH TEXAS

200 vis., No. 2-3 neutral	10.5
750 vis., No. 3-4 neutral	12.75
2,000 No. 5-6 neutral	14-14.5

LUBRICATING OILS
Mid-Continent

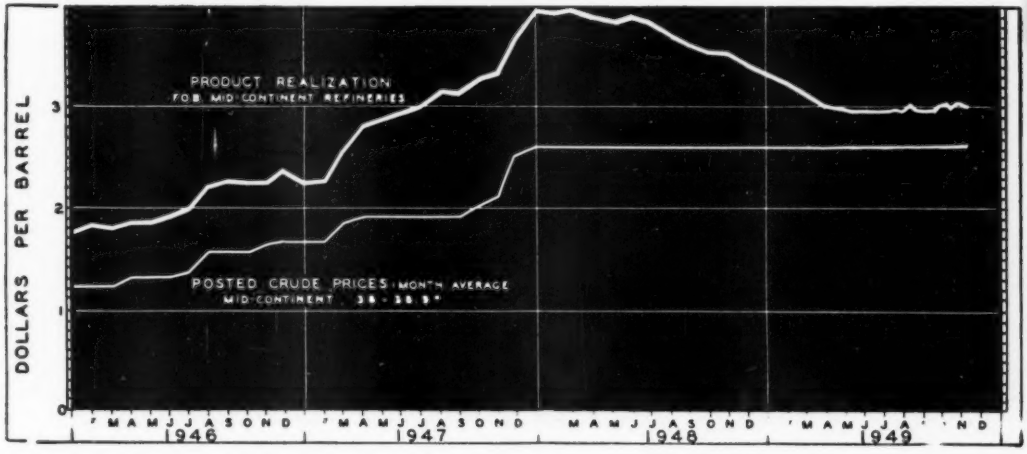
150-160 vis., D bright stock, 0-10 pp.	17-19
200 vis., No. 3 neutral, 0-10 pp.	11.5-14

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	19.5-20.5
180 vis., 0 p.t. neutral	20.5-21.5

WAX
Mid-Continent

132-134 A.M.P.	4.25



In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil

EQUIPMENT MEN . . . in the News

Oil Well Manufacturing Adds Dean to Sales Staff

Having completed a 2-week training course at the Los Angeles factory, M. Harold Dean returns to southern Louisiana where he will represent the Red Devil line of oil-field equipment, manufactured by Oil Well Manufacturing Corp. He will make his headquarters at Houma, La.

Dean has long been associated with the petroleum industry. He was directional-drilling engineer for Houston Oil Field Materials Co. in Louisiana and prior to that was with The Texas Co., and National Supply Co.

BOFED Exhibits British Oil-Field Equipment

On October 26, British firms represented by British Oilfield Equipment Co., Ltd., in overseas sales, exhibited their oil-field machinery at the firm of Mirrlees, Bickerton & Day, Ltd., Stockport, England.

Exhibiting firms were British Oilfield Equipment Co., Ltd., Leeds; Mirrlees, Bickerton & Day; J. & H. McLaren, Ltd., Leeds; Petters, Ltd., Staines; Fielding & Platt, Ltd., Gloucester; Henry Meadows, Ltd., Wolverhampton; National Gas & Oil Engine Co., Ltd., Ashton-Under-Lyne; Brush Electrical & Engineering Co., Ltd., Loughborough; and Heenan & Froude, Ltd., Worcester.

Of particular interest was the new series "J" diesel engine, designed specifically for applications of power in the oil fields of the world. This engine is manufactured by Mirrlees, Bickerton & Day, which firm, incidentally was the first recipient of the license to build the engine produced by Dr. Diesel.

Highlight of the exposition was an address by Alan P. Good, chairman of the board of British Oilfield Equipment Co., Ltd., who sketched the advance in technology in the manufacture of oil-field equipment in England. He also spoke at length on the ability of the industry, in recent months, to quote fixed prices, and the end of escalator clauses in price quotations. "We are prepared to quote fixed time for delivery and fixed prices with a penalty if we fail to deliver on time. I have no sympathy for escalator clauses and for months past we have been quoting fixed prices, and we stick to these fixed prices."

Other speakers were G. Halse, British Controlled Oilfields, Ltd.; H. G. Fletcher, Kuwait Oil Co., Ltd.; Cyril Dennis, British Oilfield Equipment; and J. T. Rymer, Mirrlees, Bickerton & Day.

In an informal discussion, T. L. Bonstow, technical advisor to the Council of British Manufacturers of Petroleum Equipment, explained, "We are creating standards, but follow American practice which will be worked out by British manufacturers and used by British oil companies."

Waterman Made Executive Vice President of Badger

Appointment of R. D. Waterman as executive vice president of E. B. Badger & Sons Co., process engineering and construction concern, has been announced by Erastus B. Badger, president.

Announcement was also made of the election of three vice presidents of the company, a subsidiary of Stone & Webster, Inc.: A. J. Broggini as vice president and sales manager, in charge of foreign and domestic sales; A. J. Connell as vice president and engineering manager, in charge of all engineering, drafting, estimating, and procurement; and A. J. Good as vice president in charge of office management, contracts, and engineering and construction cost analysis.

Thornton to Manage New United Supply Store

H. C. (Pee Wee) Thornton has been appointed manager of new United Supply & Mfg. Co. store at Elk City, Okla. He has previously served as field salesman with United at Paula Valley, Okla.

Carlson is General Counsel For Welex Jet Service

John S. Carlson, general counsel and a director of Seismograph Services Corp., has taken the position of general counsel for Welex Jet Services, Inc., Fort Worth. He has resigned as a director of Seismograph Service Corp., but will continue his connection with that firm is an advisory legal capacity.

A specialist in corporate practice and in tax problems and legal matters involved in the conduct of international business, Carlson gained national praise from the legal profession for his work in connection with an income tax case before the United States Circuit Court of Appeals, Fifth District.

The court decided in his favor in his contention that citizens of the United States, employed in field work in foreign countries, were entitled to exemption from income taxes regardless of the fact they may not have been able to establish a fixed residence in the countries in which they worked.

Homelite Corp. Occupies New Quarters in Dallas

New and improved quarters of Homelite Corp. in the Trinity industrial district of Dallas. Paul E. Ryan, Southwestern manager, announced that the firm, a manufacturer of carryable gasoline-engine-driven pumps and generators, has recently added electric and gasoline-engine-driven chain saws to its manufacturing line

Web Wilson to Have New Headquarters in 1950

The board of directors of Web Wilson Oil Tools, Inc., recently announced that as a result of a meeting of the directors, they have decided to expediate the plans for the construction of their new office buildings located on South San Pedro Street, Los Angeles.

The offices will be of modern design and arranged to increase speed and efficiency. Construction of the new offices will begin before the end of this year, and completion is expected sometime early in 1950.

Koppers Firm to Build Coating Plant in Ontario

Plans for construction and operation of an industrial protective coatings plant of 25,000-ton annual capacity at Port Arthur, Ont., by the By-Product Coke Co., of Canada, Ltd., a wholly owned subsidiary of Koppers Co., Inc., have been announced by Brehon Somervell, president of Koppers.

Initial contracts call for the delivery of 15,000 tons of enamel coatings for application on the Edmonton, Alta., to Duluth, Minn., pipe line of Imperial Oil, Ltd., and an associated company in the United States. It is expected that the plant will be in full operation within 3 months.

General Controls Adds Three New Branch Offices

J. F. Ray, vice president in charge of sales, General Controls, Glendale, Calif., manufacturer of a complete line of automatic controls, has announced the opening of new and extensive factory branch office facilities in Minneapolis, Buffalo, and Baltimore. Named as branch managers in the newly opened offices are R. Roger Rosell, Jr., Minneapolis; Paul A. Palmgren, Buffalo; and Fred H. Angier, Baltimore. All are graduate engineers and thoroughly experienced in the field of automatic controls.

C. E. Whitney Retires as Baker Vice President, To Be Succeeded by Henderson

Retirement at the end of the year of C. E. Whitney, vice president and assistant general manager of Baker Oil Tools, Inc., will mark the finish of a long and successful association with Baker. In 1906, following the

C. E. WHITNEY

R. W. HENDERSON

San Francisco earthquake and fire, Whitney learned of an oil boom at Coalinga, Calif., and took this opportunity to open a retail store which later developed into a sizable department store. During this time he became interested in the oil business at Coalinga and soon came to know R. C. Baker, Sr., who later became a prominent and colorful figure in the industry.

In 1912 Whitney formed an association with P. M. Pike, of Federal Drilling Co., in California, and in 1916 Patterson-Whitney Drilling Co. was organized for operation of both cable and rotary tools in Oklahoma and North Texas.

Whitney joined Baker Oil Tools in 1927 as sales engineer, and served successively as purchasing agent, secretary-treasurer, and vice president-general sales manager. In 1936 the company established a manufacturing plant, warehouse, and sales office in Houston, and Whitney was placed in charge as vice president and assistant general manager.

Effective January 1, 1950, Roy W. Henderson will assume the duties of assistant general manager in charge of the Central division of Baker Oil Tools, Inc., succeeding C. E. Whitney, who is retiring. Henderson started with Baker in 1935 as a shop helper sweeping chips and moving material, advancing through various shop operations, serving as stock clerk and order clerk, and becoming purchasing agent and manager of materials control in 1943.

R. L. TURNER

For the past 7 years Henderson has been active in the Los Angeles Purchasing Agents Association, and is now serving as chairman of the membership committee.

Succeeding Henderson as purchasing agent at Los Angeles will be R. L. (Dick) Turner, who has been connected with Baker since 1934, with time out for service in the United States Marine Corps. Turner started his association with Baker Oil Tools in its Houston warehouse, and since the war has been in the Los Angeles office serving as staff assistant on special administrative assignments.

Name Clark Sales Manager For Oil Well Survey Co.

Robert E. Clark, Jr., has been named general sales manager for Eastman Oil Well Survey Co., with

R. E. CLARK, JR.

ROBERT C. HILL

headquarters in the general office at Denver. Robert C. Hill has been appointed Rocky Mountain-Mid-Continent division sales manager at Denver.

Clark's experience in sales promotion work in the oil industry, particularly in the Gulf Coast and Pacific Coast areas, well qualifies him for his new position. A graduate of University of California, where he majored in geology, he started his oil career in the drilling department of Shell Oil Co. of California at Ventura, and later became associated with General Petroleum in Ventura and in Wyoming.

Hill, who joined Eastman in 1946, has been in charge of electronic sales and service at the Long Beach office. He is a graduate of University of Colorado, with a B.A. degree in petroleum engineering and oil geology.

Lane-Wells Establishes Canadian Subsidiary

Lane-Wells Co., suppliers of technical oil-field services, has announced the establishment of Lane-Wells Canadian Co., according to Rodney S. Durkee, president. Headquarters for the new company will be located in Edmonton, Alta., and a sales office will be located in Calgary. Lane-Wells Canadian will offer complete facilities for perforating, bullet and Koneshot; radio-activity well logging; packers; and drillable bridging plugs.

Officers are Rodney S. Durkee, president; N. L. Dorn, Morton T. Higgs, James D. Hughes, C. F. Ludwig, vice presidents; D. S. Jeppson, secretary-treasurer; W. A. Miller and L. H. Ingle, assistant secretaries and assistant treasurers. Ludwig, formerly Gulf Coast division sales manager, is vice president in charge of operations. All other officials are active in Lane-Wells Co.

Ludwig has been associated with the parent firm since 1937. Prior to his appointment as Gulf Coast division sales manager in 1947, he had been district superintendent in the company's Kansas, Corpus Christi, and Alice, Tex., districts. Jack Henley

will be sales engineer-geologist for Lane-Wells Canadian. He is a graduate geologist, having received his degree from University of New Mexico in 1941. He joined Lane-Wells Gulf Coast division in 1947, as a service representative. Prior to that he had worked for Humble Oil & Refining Co.

Detroit-Portsmouth to Erect New Pipe Mill

Detroit Steel Corp. and Portsmouth Steel Corp. have announced conclusion of an agreement by which the Detroit company will acquire the physical assets and the steel business of the Portsmouth company on January 1, 1950. The agreement calls for large-scale expansion of Portsmouth Steel's present finishing facilities.

The Detroit-Portsmouth agreement contemplates expansion of finishing facilities at the Portsmouth works through installation of a hot rolled sheet and strip mill and an electric weld pipe mill.

The new hot mill will produce hot bands for the cold rolled strip mill at Detroit and skelp for the new pipe mill at Portsmouth. The Ohio River location of the Portsmouth works provides ready access to the major pipe markets of the southwest.

Larson Completes Northwest Tour for McCullough Tool

W. E. (Ed) Larson, sales engineer, McCullough Tool Co., Los Angeles, has just returned from an extended tour through Alaska and the Northwest where he introduced some of the latest McCullough oil-well tools to oil-exploration crews in remote wildcat areas.

One of the highlights of the tour were several days spent in Fairbanks, Alaska, where Larson conferred with the manager of Artic Contractors, E. L. Davis, in charge of the exploration program on the Naval Petroleum Reserve at Point Barrow.

Taylor Announces Four New Representatives

Taylor Instrument Cos. have announced the placement of four new salesmen, two of them in the Tulsa territory, one in St. Louis, and one in Chicago. Damon C. Ralph, a graduate of Oklahoma A. & M. with a degree in industrial engineering, will be stationed in Freeport, La. Donald F. Sullins, also a graduate of Oklahoma A. & M. in industrial engineering, will cover the northwest section of Texas.

Charles H. Miller, formerly secretary of Insulation & Refractories Co. and a graduate of University of Rochester, will be located in Omaha. William Hile has been with the company for several years as a member of the application engineering department. He is a mechanical engineer from Purdue University with a master's degree in business administration. His territory will be the State of Indiana.

Boyles Galvanizing Plant Now in Operation in Tulsa

The newly organized Boyles Galvanizing Co., Tulsa, is now in operation, according to W. M. Boyles, president of the company. The plant will employ 50 workers to handle galvanizing jobs for concerns in the Mid-Continent states and some as far away as Pittsburgh and West Virginia.

The most modern and complete equipment available has been installed, including a galvanizing kettle 30 ft. in length with a zinc capacity of 100 tons. The galvanizing kettle was built by Flint Steel Co., Tulsa.

A 4-year-old building recently purchased from National Tank Co. will house the processing activities. A Sand Springs railroad spur enters the 7-acre property at either end, facilitating the arrival and shipment of steel. Boyles previously has held positions as manager of Rogers Galvanizing Co., plants in Tulsa and Houston. W. A. Brown, vice president of the Boyles organization, formerly was superintendent of Rogers' Tulsa plant.

Langley Will Represent Wilson in South America

Wilson Manufacturing Co., Wichita Falls, Tex., has announced the appointment of W. C. Langley, Barranquillo, Colombia, S. A., as manufacturer's agent for Venezuela, Colombia, Peru, and Trinidad.

Langley has worked in Trinidad and Venezuela as a driller and tool pusher. He has been a manufacturer's representative in South America for about 10 years with headquarters in Barranquillo, and will offer a complete parts and service department for Wilson there.

Elliott Announces Two Major Appointments

Elliott Co. has announced the appointment of C. H. Hosterman as manager of the general apparatus department. Harry A. Erb has rejoined Elliott as assistant to M. A. King, vice president in charge of engineering, with headquarters at the main plant at Jeannette, Pa.

Hosterman was formerly manager of the accessories department. He came with Elliott from Pennsylvania State College in 1922. Erb came with Elliott from Cornell University in 1928 and has served as blower engineer, manager of the service department, and manager of the electric power department.

Republic Rubber Shifts Willey and Hunter

Republic Rubber Division, Lee Rubber & Tire Corp., has transferred W. Thomas Willey to Houston as special representative, and Wayne H. Hunter to St. Louis as territory representative, according to a recent announcement by G. L. Smith, sales manager.

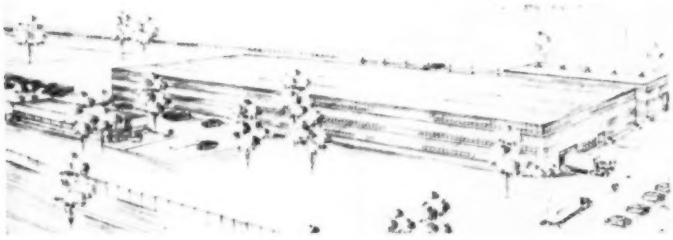
Willey will work closely with East Texas and Louisiana oil men, and will handle merchandising and engineering problems for both production and refining plants.

Hunter, who joined Republic after 3 years of Army service, is a graduate of Ohio State University.

Wilson to Represent Bunting in Southwest

Bunting Brass & Bronze Co. has announced the appointment of Lloyd C. Wilson as representative in Texas and Oklahoma. Wilson is a graduate of Southern Methodist University in mechanical engineering. Wilson will divide his time between distributors of stock lines and users of special bronze bearings.

Construction Under Way on A. O. Smith Pipe Mill



An architect's drawing of the welded steel (large-diameter) pipe mill to be constructed on property adjacent to Sheffield Steel Corp.'s plant at Houston. A. O. Smith Corp. and Armco Steel Corp. will be coowners of the plant. (The Oil and Gas Journal, October 6, page 387.) Austin Co., which was awarded contracts for design and construction of the 150,000 sq. ft. plant, has already started work on the foundation

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads, 12 cents a word. Minimum charge, $3.00 per insertion.
Centered Line, any ad, $1.00.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

DISPLAYED, PER INCH

$12.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

MANUFACTURERS REPRESENTATIVE

MANUFACTURERS WANTED: Recently organized oil field and industrial supply house will represent manufacturers as agent for Gulf Coast Oil company and supply house following. Will accept merchandise on consignment basis. Box D-287, The Oil and Gas Journal, Tulsa, Okla.

EQUIPMENT FOR SALE

FOR SALE: 1—10M-1000 National Dehydration Unit complete with all standard equipment and activated alumina. Completely assembled and tested but never operated. Located at Refugio, Texas. Contact Purchasing Agent, La Gloria Corporation, P. O. Box 779, Corpus Christi, Texas.

FOR SALE

12—230 H.P. Type 10 Bessemer New 17" Power Cylinders complete ready to run with 16" to 18" Compressors. 1—230 H.P. Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 655, Evansville, Indiana

Will consider leasing several 80,000 barrel steel tanks for sweet crude storage at Mexia, Texas.

We also have steel storage tanks for sale as follows:

7—55,000 bbl., Maud, Oklahoma
15—80,000 bbl., Hominy, Oklahoma

For further information write:

STANOLIND OIL PURCHASING CO.
Attention L. M. Jones, Box 591, Tulsa, Oklahoma

NEW PIPE FOR SALE

(Subject to Prior Sale)

5000 Ft. 9⅝", 36#, J55, Range 2, 8 Rd. Thrd. Seamless Casing
4000 Ft. 8⅝", 28# Ditto
19,000 Ft. 6" Std. Byars L.W. W.I. Pipe

Specification ASTM-AF2-33

Contact

National Cooperative Refinery Assn.
Phone 820 McPherson, Kansas

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

CHICAGO Pneumatic #10 Utility Air Hoist with standard drum for 700 feet ⅜" cable. Brand new. Will sacrifice. Armstrong & Sons, Ridgefield, N. J.

FOR SALE: Cardwell Rotary Rig, complete with Mast. Suitable for 3,500 ft. drilling. Bargain. Terms. Melton Supply Co., Seminole, Okla.

FOR SALE: New Buda Models 6B-230 mounted with reconditioned war surplus Gaso 1860, 4½ x 6 Power Pumps. $1,765 FOB Houston. Fitted for slush service $1,890. Bumgardner Supply Co., 913 Boundary, Houston 9, Texas.

New Wire Rope at Money-Saving Values: Leading brands. Sizes ¼" to 1¼". 6x19, 6x37, construction for all purposes. Degen Pipe & Supply Company, Box 107, Red Fork Station, Tulsa, Oklahoma.

FOR SALE: McKissick Tubing and Floor Blocks. **Save 50%.** Melton Supply Co., Seminole, Okla.

FOR SALE

3 WAK Waukesha motors in good condition. Complete with butane equipment and skids. May be seen at our Odessa Yard.

DONNELL DRILLING COMPANY
O'Michael Bldg., Odessa, Tex.

FOR SALE—FORTUNE, TEXAS (15 miles from Houston on Burlington-Rock Island R.R.)

ALL STEEL FIVE CAR LOADING RACK PRACTICALLY NEW
2 SECOND HAND 1,000 BARREL BOLTED STEEL TANKS
2 NEW 1,000 BARREL BOLTED STEEL TANKS

If interested in making an offer on the above material together with Valves, Pipe and Fittings, contact

MOORE OIL TERMINALS
City National Bank Bldg., Houston, Texas

EQUIPMENT FOR SALE

NATIONAL "50" Compound Double Drum Rig 126' Cantilever Ideco Mast, 10' substructure, 6,000' 4½" drill pipe, this rig complete and in excellent condition. P.O. Box 205, Sta. B, Bakersfield, California.

FOR SALE: Two Fairbanks-Morse Diesel Engines, 150 H.P. Twin Cylinder, Horizontal Type. Completely overhauled. $1500.00 each. Melton Supply Co., Seminole, Okla.

ROLAGRIP COUPLINGS—For Sale, 100 tons, 1½" to 8" inclusive. New, never used, complete with bolts and neoprene gaskets. Price 50% less than manufacturers selling price. Send for list. JULIUS M. FOGELMAN, Reading, Pa.

FOR SALE: One 6-DT-317 and one 4-DC-645 Buda Diesel Engine. New engines at 25% off factory list. R. A. Young & Son, Inc., Fort Smith, Arkansas.

FOR SALE—10 miles 10¾" OD 40.5# lapweld pipe. This good used line pipe is racked and ready for immediate delivery. Located in Oklahoma. Bethlehem Supply Company, Box 2171, Tulsa 2, Oklahoma.

New U.S. Pressure Gauges

Fig. 539, 0-100# gauge illustrated, has two hands operating from two separate mechanisms for one or two gauging operations at the same time.

Government cost	**$30.00**
Our cost	**$ 4.50**

10% discount in doz. lots; other discounts on larger quantities.

Write for illustrated catalog describing 1000's of Ashcroft, U.S., Marsh and other popular makes, pressures and sizes.

All gauges are shipped subject to your trial and acceptance and are brand new in original factory carton.

All prices FOB Tulsa.

T. & T. TOOL CO.

101 West Archer Tulsa, Oklahoma

NEW PORTABLE CENTRIFUGAL PUMP UNITS

$3000.00 Value — Only $1250.00

Byron Jackson 3" PUP Pumps Direct Connected to C-36 Chrysler Engines

Many hundreds in use for oil gathering, salt water disposal, fire protection and many other applications.

LUCEY PRODUCTS CORPORATION
624 S. Cheyenne TULSA, OKLAHOMA Phone: LD 204

LINE PIPE FOR SALE

300,000' 8⅝" OD 28.55 lb. LW Line Pipe

56,000' 6⅝" OD 18.97 lb. LW Line Pipe

36,000' 4½" OD 10.79 lb. LW Line Pipe

All double random lengths, cleaned, straightened and bevelled.

This pipe used in a main oil line is in process of being taken up and available for immediate shipment from the Cushing-Guthrie area.

HERMAN KAISER PIPE & SUPPLY CO.
819-20 Palace Building, Tulsa, Oklahoma
Tel.: 3-3413, 4-6258 At Night 5-8633

EQUIPMENT FOR SALE

50,000′ of 3½″ OD 14 Gauge plain end, 20-24 ft. joints J & L 800# test pressure tubing immediate delivery. Dale W. Moore, 504 City Natl. Bk. Bldg., Houston, Texas.

ONE complete power rotary rig, suitable for drilling to 10,000 ft., will sell at a bargain. As a complete rig or by units. F. D. Bridges, Phone 3-7810, 1109 Euclid, Oklahoma City, Oklahoma.

GENERATORS for diesel driven electric power, 125 KVA, 240/280 volt, 3 phase, 60 cycle, 900 RPM, complete with exciters and control cabinets, connections for parallel operation of two or more generators, brand new, manufactured by Electric Machinery Manufacturing Company, $2000.00 each, seven available Northern Ordnance, Incorporated, Minneapolis, Minnesota.

Several Army Surplus 4½″ x 6″ Gaso Duplex 1860 Pumps — two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

STEEL STORAGE TANKS

Railroad Tank Car Tanks. 6,500 to 12,000 Gal. Cap. Coiled and Non-Coiled.

Cleaned—Painted—Tested
Heavier—Safer—Cheaper
Other Tanks, Too.

Also — Complete Tank Cars 8,000 and 10,000-Gal. Cap.

Your Inquiries Solicited

NEWHALL-MARSHALL-WOOD, INC.

30 Church Street New York 7, N. Y.
Phone: COrtlandt 7-8090

WATCH THIS SPACE FOR OUTSTANDING WEEKLY VALUES

HEATERS!

1—3 section, gas fired, 56 tube convection, 12 tube radiant shock, 16 tube wall radiant. Tubes 4½″ O.D. x 4′ I.D. x .026″ walls.

2—U.O.P. center wall, gas fired updraft types 16′7″ x 12′8″ x 25′ high, 2 streams. 38 tubes per unit 4″ x 3.364″ x 14′ long. BTU/sq. ft./hr. (a) internal 4879 (b) external 4100.

4—U.O.P. modified updraft types, gas fired, 16′7″ x 5′9″ x 12′ high, 3 streams. 36 tubes per unit 4″ x 3.364″ x 14′ long. BTU/sq. ft./hr. (a) internal 2950 (b) external 2480.

ALL UNITS COMPLETE
STRUCTURAL STEEL, CONTROLS, ETC.
USED • EXCELLENT CONDITION

DULIEN STEEL PRODUCTS, INC.
of Washington
P. O. BOX 667
COTTON VALLEY, LA.
PHONE: COTTON VALLEY 26

EQUIPMENT FOR SALE

FOR SALE: Oilfield machine shop, good location, excellent equipment. $22,500.00. Write Box 683, Seminole, Texas.

FOR SALE

Two 1440 HP GM 16-278A Diesel Engines and two GM 3-268A Diesel Engines—Westinghouse 100 KW AC Generator Sets. Complete with all Aux. Equip. Practically new. Inspect. Make offer. Box D-284, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPE FOR SALE

Several thousand feet of each of the following sizes of good used pipe:

2″—good threads and long collars.
3½″ O.D.—heavy boiler flue.
4½″ O.D.—8-pound gas line.
6″ O.D.—10.22 line pipe.
6″ O.D.—14-pound high pressure pipe.

All in excellent condition and ready to use.

THE ALLEN GAS CORPORATION
Paola, Kansas

STEEL STORAGE TANKS

1—55,000 bbl., Riveted
2—18,000 bbl., Welded
1—17,500 bbl., Riveted
1—5,000 bbl., Welded

Above tanks all with steel cone roofs, now dismantled, match-marked for re-erection and available for immediate delivery. Detailed specs. and price available upon request.

HORWITZ PIPE & STEEL CO.
Phone 2-9128 Tulsa, Okla.

EQUIPMENT WANTED

FAILING model 44, Failing 55, Sullivan 200, or other drill simlar capacity, Drill rod N, PK. Box D-277, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

AGENTS WANTED: Armstrong Internal Condenser Tube Cutters. Owing to our recent expansion program, we have a few openings for reliable agents. Apply listing lines now handled and territory covered. Armstrong & Sons, Ridgefield, N. J.

GAS ENGINEER. Opening for gas engineer with at least five years general experience in natural gas business. Work in distribution and utilization phases of business particularly important. Age, under 35. Location, Northwest, and position will involve some travel. Box D-289, The Oil and Gas Journal, Tulsa, Oklahoma.

PARTY CHIEF

A highly regarded, long-established, growing geophysical company is looking for the best party chief available.

Successful applicant must have a college degree and at least five years' experience as a seismic party chief. He must be a highly skilled interpreter and must be widely and favorably known in the industry.

He must have the vision to recognize a unique opportunity and the courage to take advantage of it. This is not an ordinary job, to be filled by an ordinary man—the rewards will be in keeping with the individual's competence and capacity.

If you are interested and think you can qualify, write giving full particulars including age, education, experience and salary expected. If available, please enclose a small photograph. Our Employes know of this ad. Replies will be held in strictest confidence.

BOX D-289

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

NEW foreign and domestic Oil Employment Directory. Over 500 listings in drilling, production, refining, natural gasoline pipe lines, geological, exploration, supplies manufacturers, services; and trucking, refinery and pipe line contractors, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla (Our 28th year).

ENGINEERS, executives, Technical Men Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection, will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

PIPELINE operator for Mid West gathering system 3500 b-d. Must be experienced and aggressive. Box D-290, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Experienced gas gathering system and gas measurement man, immediate employment, for gasoline plant location in central Texas. Write giving experience, age, family, present employer, and salary expected. All replies strictly confidential and all of our employes have been notified of this advertisement. Box D-286, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES REPRESENTATIVE

Fully qualified person to sell tar saturated asbestos pipe line felt on national basis but with headquarters in Southwest.

Should have knowledge of market and application with good acquaintance in the pipe line industry.

Good salary plus expenses, additional compensation later tied in with accomplishment. Reply giving details to:

GAMA INDUSTRIES, INC.
70 Pine Street
New York 5, N. Y.

SITUATIONS WANTED

ROTARY DRILLING Superintendent now employed desires to change to West Texas or Mid-Continent area. Family of four, sober, dependable, investigation invited, references. Box D-273, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY SUPERINTENDENT: 35 years of age, 16 years experience, complete refinery, 18,000 bbl. per day capacity. Offer best references; available immediately. Box D-276, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131, Ph. No. 131, Hobbs, New Mexico.

MICROPALEONTOLOGIST: 3 years experience, B.A. degree, and one year of graduate study available January 1. Box D-279, The Oil and Gas Journal, Tulsa, Oklahoma.

TRANSPORT pilot, ex-Navy, five years NATS, two years airline experience; 5400 hours—Beechcraft, DC-3, DC-4; valid CAA Airline Transport Pilot license; will accept domestic or foreign employment plus collateral duties, contact BEU, 532 Moselle, Buffalo, New York.

REFINERY or Engineering Executive: Sixteen years experience in refinery administration, operation, design and maintenance. B.S. Petroleum Refining. Advanced business and engineering training. Age 37, married. Box D-291, The Oil and Gas Journal, Tulsa, Oklahoma.

RANCHES

26,000 ACRE ranch, Las Animas Co., Colo. Well grassed and watered. Mineral possibilities. Only $10 per acre with ½ minerals. Full information, write Guy Speakman, 1326 E. Kiowa, Colorado Springs, Colo.

LEASE AND DRILLING BLOCKS

INTERESTED in a small to medium water flooding proposition in Kansas or Oklahoma. Box D-285, The Oil and Gas Journal, Tulsa, Oklahoma.

LAND for oil lease. 2,000 acres. Part Agua Dulce tract. Five miles north Harlingen, Texas. Oil producing around this area. Write Edward Gee, 2600 West 79th, Chicago, Illinois.

PRODUCING Oil Leases in Oklahoma for sale. Seek contact with parties desiring purchase of entire properties. References exchanged. Address Box D-246, The Oil and Gas Journal, Tulsa, Okla.

WILL invest in producing or semi proven royalties, leases, or partly finance shallow development deals. Write full details first letter or phone H. A. Hawthorne, Thibodaux, La.

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PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

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Permian Basin

(Continued from page 185)

Ridge Canyon field, dry, TD 8,111 ft., elevation 2,315 ft., Pennsylvanian 6,900 ft., Ellenburger 8,052 ft.

Sutton County: Edward C. Lawson 1 J. M. Vanderstucken, NW NE 62-7-TW&NG, A-1045, 4 mi. W Shell 1 Wilson, dry, TD 4,311 ft., elevation 2,205 ft., Strawn 4,199 ft.

Tom Green County: J. Ralph Stewart 1 T. L. Wood, Sec. 133, Dist. 11, SPRR Sur., 4 mi. N Susan Peak field, dry, TD 5,775 ft., elevation 1,925 ft., Strawn 4,820 ft., Detrital 5,345 ft.

Yoakum County: Cabot Carbon Co. 1 Bessie Clay, SW SW 12-D-J. H. Gibson Sur., 4½ mi. NE Ownby field, dry, TD 5,336 ft., elevation 3,556 ft., Yates 3,330 ft., San Andres 4,680 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—T. P. Coal & Oil Co. 1-B State, Account 1, northeast outpost to Bagley field, in 2-12s-33e, cored dolomite with pin-point porosity from 10,874-914 ft. A drill-stem test from 10,870-914 ft., open 6 hours and 10 minutes, showed gas in 2 hours and 37 minutes, and oil in 4 hours and 9 minutes. On 30-minute flowing tests, it gaged 12, 4, and 4 bbl. of oil, or 20 bbl. total in 1½ hours. The oil tested 46.6° gravity. Recovery in the pipe was 9,954 ft. of oil, 900 ft. of mud-cut oil, and 60 ft. of gas-cut drilling mud. Flowing pressure was 370 psi., and 4,200 psi. shut in.

A 4-hour drill-stem test previous to the above, from 10,824-874 ft., recovered 550 ft. of oil, 1,050 ft. of heavily oil and gas-cut mud, plus 250 ft. of mud. Flowing pressure was 550 psi., and 4,200 psi. shut in.

Amerada Petroleum Corp. 1 B. C. Roach, NW SW 26-12s-33e, ½ mile south of the 1-BTB discovery, was drilling lime below 9,775 ft. A 4-hour drill-stem test at 9,380-9,430 ft. had gas in 8 minutes, estimated at 33,000 cu. ft. daily, and recovered 360 ft. of heavily oil and gas-cut mud, 630 ft. of oil, and 540 ft. of salt water. Flowing pressure was 655 psi., and 1,925 psi. shut in.

Northeast of Lovington in 13-15s-37e, Atlantic Refining Co. 1 Dickinson was drilling ahead at 10,840 ft. in lime. A 1-hour drill-stem test from 10,573-620 ft. recovered 6,390 ft. of sulfur water, under flowing pressure of 3,125 psi. A second 1-hour test from 10,781-840 ft. recovered 5,550 ft. of sulfur water. On an elevation of 3,792 ft., operators top on the Mississippian was 10,780 ft.

Gulf Oil Corp. 1 Chamberlain, NW NE 14-15s-37e, was drilling at 6,675 ft. Projected depth was 11, 500 ft.

The Texas Co. 1 Ertel, NE NW 27-16s-38e, northwest outpost to Knowles field, recovered 450 ft. of drilling mud with no shows, on a 30-minute drill-stem test at 8,288-8,590 ft. Drilling continued below 8,702 ft.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCAT

Eddy County: A. T. Wright 2 Yates, NW NW NE 7-20s-27e, SE of McMillan field, TD 652 ft. in sand, elev. 3,364 ft., Red sand 526 ft., top pay 651 ft., pumped 35 bbl. of 38°-gravity oil per day.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Chaves County: Union Oil Co. of California 1 State-Fairbairn, SW NW 24-14s-31e, dry, TD 4,490 ft., elev. 4,390 ft., Yates 2,300 ft., San Andres 3,790 ft., Queen 3,095 ft.

Montana-Wyoming Proposal Is Argued Before FPC

Federal Power Commission ordered intermediate decision procedure omitted and scheduled oral argument to begin November 21 in Washington, D. C., in the proceeding involving joint application of Montana-Dakota Utilities Co. and Montana-Wyoming Gas Pipe Line Co. for authorization to construct a pipe-line project which would make available an additional 35,000,000 cu. ft. of natural gas per day to Montana-Dakota's customers in Montana and North and South Dakota.

Both companies had requested the commission action in order to speed final decision in the proceeding, and the FPC staff concurred in the motion. FPC pointed out that unless final action is taken prior to December 31, the gas-purchase contracts and the financial arrangements of the two companies will expire, and unless the intermediate decision procedure is omitted, it appears that a decision by FPC cannot be rendered before that date.

The companies' proposal includes plans for a 340-mile, 12¾-in. pipe line extending from the Worland field in Washakie County, Wyoming, to Montana-Dakota's Cabin Creek compressor station in Fallon County, Montana; a combination gas-compressor, dehydration, and sulfur-removal plant near the Wyoming origin of the line; and two branch lines, one connecting with the existing 8-in. pipe line at Miles City, Mont., and the other connecting with a distribution system to be built by Montana-Dakota in Forsyth, Mont.

Tide Water Arranges for Cuyama Valley Crude Oil

Tide Water Associated Oil Co. has made arrangements with Richfield Oil Corp. for a supply of crude oil. The new crude supply, from the Cuyama Valley of California, will be available in volume which, with the firm's own production and other purchases will adequately supply its Pacific Coast refining facilities.

The arrangement calls for a crude-oil supply for a firm period of 5 years, beginning January 1, at posted field prices. The crude will take the place of crude purchased since 1938 from Mrs. Carrie Estelle Doheny and Los Nietos Co.

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CALENDAR OF EVENTS

November

Exposition of Chemical Industries, Grand Central Palace, New York, November 20-December 3.

American Society of Mechanical Engineers, annual meeting, Hotel Statler, New York, November 27-December 2.

West-Central Texas Oil and Gas Association, annual membership and technical meeting, Abilene, November 29.

Mid-Continent Oil and Gas Association Kansas-Oklahoma Division, annual meeting Tulsa Building, Tulsa, November 29.

December

American Institute of Chemical Engineers, annual meeting, William Penn Hotel Pittsburgh, Pa., December 4-7.

Interstate Oil Compact Commission, annual meeting, Roosevelt Hotel, New Orleans, December 5-7.

Annual joint meeting of Texas sections of American Institute of Mining and Metallurgical Engineers, Texas A. & M. College, College Station, Tex., December 8-9.

American Chemical Society, southwest regional meeting, Oklahoma City, December 8-10.

National Society of Professional Engineers, annual meeting, Houston, December 8-10.

Natural Gasoline Association of America, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex., December 9.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas Nomads, first Monday of each month, Texas Room, Baker Hotel.

Houston Nomads, second Monday of each month. Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads, business meeting, Louis Sherry's Restaurant, November 21; annual Christmas party, Biltmore Hotel, December 3.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given tha the lands listed herein are offered through sealed bids on the terms hereinafter specified, to qualified bidders of the highest cash amounts per acre as a bonus for the privilege of leasing the lands under sec. 17 of the Leasing Act of February 25, 1920 (41 Stat. 437; 30 U.S.C. sec. 181), as amended. All bids must be submitted to the Director, Bureau of Land Management, Washington 25, D. C., on or before 1 p.m. of the date set out herein. Each bidder must submit with the bid one-fifth of the amount bid in cash or by certified check on a solvent bank or by money order made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required under 43 CFR 192.42 (a) (2) and (a) (3), Circular 1730. The envelopes should be plainly marked that they are not to be opened before the date and hour set out herein, and should show the number of the parcel and the name of the field. No bids received after the hour fixed herein for receiving bids will be considered. The remainder of the bonus and the annual rental must be paid and an acceptable surety bond in the sum of at least double the amount of rental, but in no case less than $1,000 nor more than $5,000, must be furnished by a successful bidder prior to the issuance of a lease. An acceptable $5,000 surety bond will be required prior to commencing drilling operations on the land. The deposits of the other bidders will be returned upon acceptance of the successful bids. Bidders are warned against violation of section 1860, Title 18, U. S. Code, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids. Royalties payable to the United States will be at the rate of 12½ per cent to 25 per cent for oil, and 12½ per cent to 16⅔ per cent for gas, in accordance with Schedule B in the lease form. Annual rental will be at the rate of $1.00 per acre. The lands are in the known geologic structure of the Wilson Creek field, 6th P.M., Colorado, and are offered in the following parcels: T. 2 N., R. 94 W., Parcel No. 1, sec. 10, N½NE¼, SE¼NE¼, 120 acres. Parcel No. 2, sec. 11, NW¼, N½SW¼, SE¼, 400 acres. T. 3 N., R. 94 W., Parcel No. 3, sec. 13, SW¼, 160 acres. Parcel No. 4, sec. 13, S½SE¼, 80 acres. Parcel No. 5, sec. 24, NE¼, 160 acres. Parcel No. 6, sec. 24 W½SE¼, sec. 25, NW¼NE¼, 120 acres. Total 1040 acres. Bids must be submitted on or before 1 p.m. December 14, 1949, and must be submitted on each parcel separately, but no objection will be made to the award of more than one parcel to the same successful bidder. Marion Clawson, Director.

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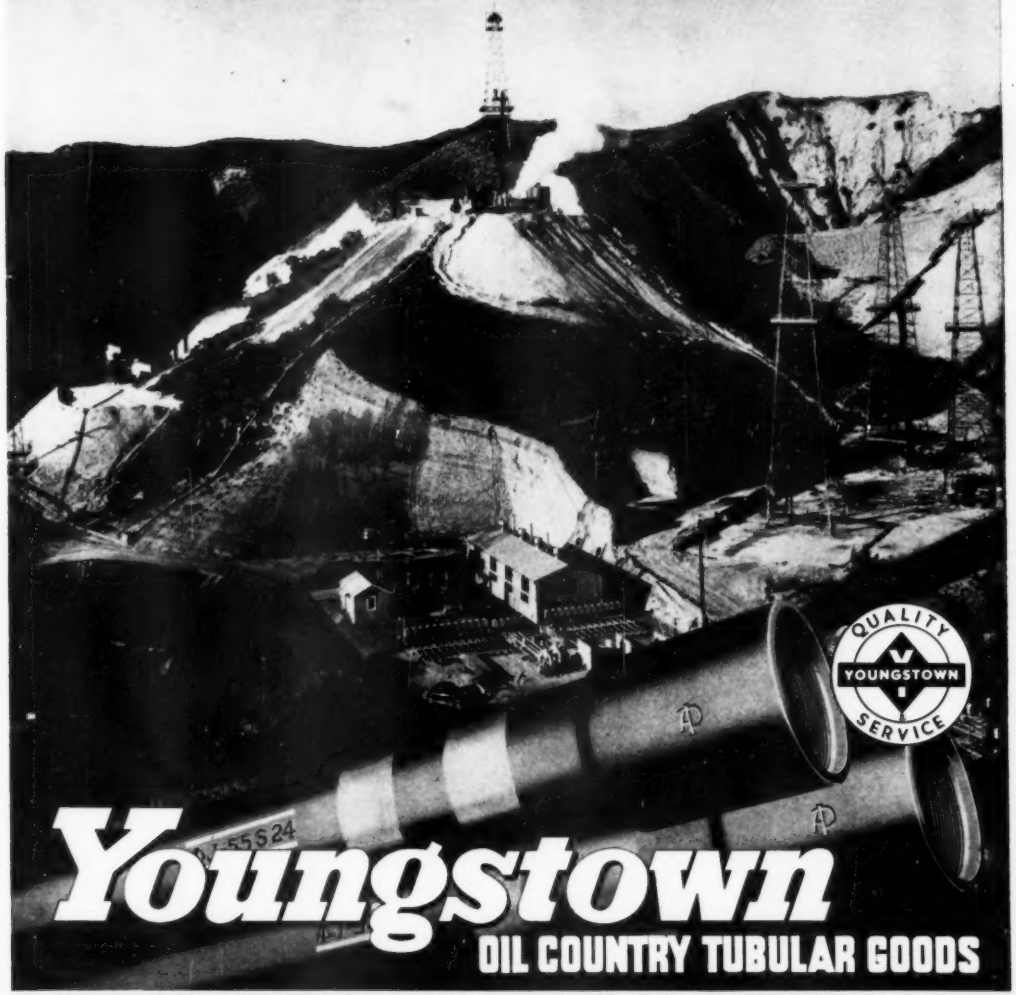

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